THE

ELECTRICAL REVIEW.

VOL. LXXIV. JUNE 19, 1914. No. 1,908.

ELECTRICAL REVIEW.

Vol. LXXIV.] CONTENTS: June 19, 1914. [No. 1,908.

	Page
Difficulties in Canada: An Organisation Needed	1017
The Underwriters' Code and Canadian Trade	1018
Half-Watt Lamps...	1018
The Copper Situation	1019
F.O.B.	1019
Public Servants and the House of Commons	1020
A Merchants' Association in Germany	1020
The I.M.E.A.	1020
The Municipal Electrical Convention	1021
The Annual Dinner	1021
Presidential Address	1021
Some Notes on the Commercial Development of Electricity Supply in Moderate-Sized Towns (*illus.*)...	1023
The Commercial Development of Supply	1024
Correspondence—	
Review of "Electrical Meters"	1025
Is Aluminium Diamagnetic?...	1025
Comparative Economics of Tramways and Railless Electric Traction	1026
A Motor Problem	1026
Legal	1026
Business Notes	1028
Italian Electrical Progress in 1912-13	1034
The Works of Messrs. J. H. Tucker & Co., Hay Mills (*illus.*)	1035
Hotel Lighting Fittings (*illus.*)	1038
A Question of Status	1039
Opening for Electrical Goods in the Levant	1039
Electrical Terms and Definitions (*continued*)	1040
Notes	1040
City Notes	1043
Share List of Electrical Companies	1047
The Drying and Preservation of Timber by Electricity (*Illus*)	1049
Reviews	1950
Notes from Canada	1052
Bradford Electrical Exhibition	1052
New Electrical Devices, Fittings and Plant (*illus.*)	1053
Foreign and Colonial Tariffs on Electrical Goods	1055
New Patents Applied For, 1914...	1055
Expiring Patents, taken out in 1900 (*concluded*)	1056
Abstracts of Published Specifications	1056
Contractors' Column ... ...Advertisement pages xxiv and xxvi	

THE ELECTRICAL REVIEW.

Published every FRIDAY, Price 4d.

The Oldest Weekly Electrical Paper. Established 1872.

TO BE OBTAINED BY ORDER FROM ANY NEWSAGENT IN TOWN OR COUNTRY.

OFFICE:—4, LUDGATE HILL, LONDON, E.C.

Telegraphic Address: "AGEEKAY, LONDON." Code, A B C.

Telephone Nos.: Holborn 933; Central 4425 (Editorial only).

The "Electrical Review" is the recognised medium of the Electrical Trades, and has by far the Largest Circulation of any Electrical Industrial Paper in Great Britain.

Subscription Rates.—Per annum, postage inclusive, in Great Britain, 19s. 6d.; Canada, £1 1s. 8d. ($5.30). To all other countries, £1 10s.

FOREIGN AGENTS:

ADELAIDE: Messrs. Atkinson & Co., Gresham Street.
AUCKLAND, N.Z.: Gordon & Gotch, Albert Street; The Mining and Engineering Review, 31A, Strand Arcade, Queen Street.
BERLIN: Asher & Co., Unter den Linden; Speyer & Peters, Unter den Linden 43, N.W. 7.
BRISBANE: Gordon & Gotch, Queen St.
CHRISTCHURCH, N.Z.: Gordon and Gotch, Manchester Street.
DUNEDIN, N.Z.: Gordon & Gotch, Princes Street.
JOHANNESBURG, CAPETOWN, BLOEMFONTEIN, DURBAN, PORT ELIZABETH, &c.: Central News Agency, Ltd.
LAUNCESTON: Gordon & Gotch, Cimitiere Street.
MELBOURNE: The Mining & Engineering Review, 90, William Street; Gordon & Gotch, Queen Street.
MILAN: Fratelli Treves.
NEW YORK: D. Van Nostrand, 25, Park Place.
PARIS: Boyveau & Chevillet, 22, Rue de la Banque.
PERTH, W.A.: Gordon & Gotch, William Street.
ROME: Loescher & Co., Corso Umberto 1° 307.
SYDNEY: The Mining & Engineering Review, 273, George Street; Gordon and Gotch, Pitt Street.
TORONTO, ONT.: Wm. Dawson & Sons, Ltd., Manning Chambers; Gordon and Gotch, 132, Bay Street.
WELLINGTON, N.Z. Gordon & Gotch, Cuba Street.

Cheques and Postal Orders (on Chief Office, London) to be made payable to THE ELECTRICAL REVIEW, and crossed "London City and Midland Bank, Newgate Street Branch."

THE UNIVERSAL ELECTRICAL DIRECTORY

(J. A. Berly's).

1914 EDITION

H. Alabaster, Gatehouse & Co., 4, Ludgate Hill, London, E.C.

DIFFICULTIES IN CANADA: AN ORGANISATION NEEDED.

THE necessity that exists in some of our Colonies for strong representative British manufacturers' organisations to watch over British interests is emphasised in the "Notes" from our Canadian correspondent, published on another page to-day.

Experiences arise from time to time calling for protest or deputation to powers in authority, for British traders' interests, when left to themselves, are not always allowed to have fair play by large purchasing bodies. In such cases no single firm, nor a score of firms acting separately, can properly deal with the situation. Effective representations can only be made when they have the full force of an organisation behind them. In addition to being of service when particular matters call for attention, such organisations by their mere existence may have a moral effect, and act as a preventative of that unfair treatment that they are designed to overcome.

We commend the suggestion of our correspondent to the serious attention of our manufacturers who will know whether the conditions of the Canadian market can better be met by a branch of the B.E.A.M.A., or by a more comprehensive Association along the lines of the Association of British Manufacturers' Agents in Australia. The criticisms that are frequently received regarding the disabilities under which we labour in the Canadian market seem to us to fully justify the establishment of such an organisation as soon as possible. A number of our electrical firms have already spent a great deal of time and money in opening branches in Canada; it will be a thousand pities if such efforts lose any of their chances of success through lack of some combined endeavour to watch "events" as they arise, and to aim at securing the removal of grievances. That there are "events" and grievances seems to be pretty clear from information which reaches our ears from time to time.

For instance, several communications have come to hand lately regarding the placing of contracts by the Hydro-Electric Power Commission, whose operations extend throughout an area three and a half times as large as Great Britain. One writer says that this Commission called for tenders for ten thousand meters, and closed the list within five days after the manufacturers received notification. This was an unreasonably short time to allow for such important business. He states that the next move was to let out (accidentally) the prices which were bid on the ten thousand, and then tenders were called for fifteen thousand meters drawn over two years. A large number of these instruments, it is said, were for re-sale to various local municipalities. This system of doing business was very much resented, as also is the attempt to squeeze out of Ontario all but one manufacturer of meters for two years. The writer continues:—

It is due to the European manufacturer that the various consumers should be able to buy meters at a reasonable price in Canada, but if business is to be conducted on the before-mentioned lines, it will not be long before the European interests withdraw. The result of this would be, from the customer's point of view, that they would again have to pay a high price which would result in huge profits for the companies then in the field. Could not the B.E.A.M.A. take this matter up and prove to those in power that such methods are not, in the long run, of very great advantage to them?

We understand that a contract for another class of manufactures for a long period has since been placed, and nobody knows which class may follow next, or where the practice will stop. It is undesirable that a powerful authority should in such a way close the door to European firms (who may already have shown their ability to give satisfactory service), not only by the placing of these particular contracts, but by setting an example which will probably carry a good deal of weight with municipal authorities all over the Dominion to the detriment of many firms. These municipalities will know that the hall-mark of the Commission has been given to a particular manufacture without being aware that the settling factor may only have been perhaps some trivial detail in shape or finish. Our sympathy is naturally with firms who have toiled steadily for several years to build up a business in an especially promising province, only to find, just as they had begun to feel their feet, that some influential concern, public or private, has arbitrarily taken away at one stroke practically all chance of business for at least two years.

We mention the foregoing as one of the many matters that might well be handled through a British organisation of some kind. Our Canadian correspondent mentions other questions which are of equal importance to all who are anxious that British manufacturers may operate in the market unhindered by prejudice and other unreasonable handicap.

THE UNDERWRITERS' CODE AND CANADIAN TRADE.

From time to time we have opened our pages to discussion on the Electrical Code of the Chicago Underwriters and its effect upon British trade in Canada. That Code has been viewed with suspicion by some of our firms, and regarded as an American barrier to various lines of British manufactures. Opinions of this character have sometimes been expressed by those who have visited the Dominion, but it is to be feared that occasionally they are given utterance to on no other authority than that of hearsay, no lengthened study either of the Code itself or of the market and its requirements having been made. It seems impossible that any firm can hope to be able to deal in an enlightened and successful way with this market without a thorough study of both the Code and the market.

British manufacturers have often been told that their failure to do better in Canada is due to their not adapting their manufactures to the requirements of the country. If they desire to do a good electrical business with Canada, the attitude of "take it or leave it" will have to be abandoned, for it is not to be supposed that we can alter the conditions which obtain there as the result of development operations that have extended over many years. It is unwise to excuse our own shortcomings by laying all the blame at the door of the Chicago Underwriters; a more profitable occupation would be to inquire into the origin and purpose of the Code and its development and application to conditions with the making of which it had nothing to do. British activities in the Canadian market are in many lines comparatively recent; the United States, with its enormous electrical industry and far-reaching connections, is just over the border-line; and when the Code has been revised, as it is with great care periodically, Americans and Canadians have naturally been taken into conference, framing the Underwriters' requirements in such a way to ensure a maximum of safety under the conditions prevailing in a territory new and in process of development, where American electrical engineering already in possession had not unnaturally made its impression. If British firms and British manufacturers complain that their interests are not studied in the Code, it is not that the Chicago Underwriters are anti-British or that they have any interests whatever in encouraging American designs, but because of the limited British electrical activity in the past and the resultant predominance of American electrical practice. If the electrical requirements of the people of Canada are such that American manufacturers in trying to meet them have less difficulty in meeting the requirements of the Code, it would seem to follow as the night the day that English manufacturers have either got to pursue a like course or be less successful than their manufacturing merits warrant. It is not suggested that this or any other set of rules has reached perfection—the fact that periodical revision takes place is proof of the recognition of that—and we learn that, far from having any feelings of hostility to the product of this country, the Underwriters are quite open to hear whatever suggestions or objections we have to offer. That is a perfectly reasonable position to take up. What so far may have been vague and general objections, may now be put down in black and white in definite terms, and suggestions which are not contrary to the safety requirements of the Underwriters, will, we are assured, receive every consideration.

Very naturally British firms objected to sending to Chicago to secure approval of manufactures intended for a British Colony, and when representations on the point were made, an endeavour was made to meet this legitimate objection by the appointment of inspecting engineers in this country who would, as the Underwriters' British representatives, examine, test, and approve suitable British manufactures on this side. Since that appointment was made complaints against the Code have been fewer than formerly, and, as a matter of fact, we believe that, speaking generally, the difficulty has been met, though the advantage taken of the London facilities has not been large. The objection that we could not get an increased turnover into Canada while we had to go to Chicago does not hold good to-day, and we look for larger business in consequence. It will hardly be possible to expect the Underwriters to place more extensive facilities at our disposal on this side until the turnover is large enough to justify their establishment and upkeep.

An important point that should not be lost sight of is the value of the Underwriters' Label. We are assured that nothing will be done to reduce the high standards imposed. The more stringent the test the higher has become the reputation of the Code and of articles approved thereunder. We believe that certain tests applied by the Underwriters' inspectors in electrical factories in this country have been a revelation to some of our own engineers, in respect to both their severity and their originality. When it is complained that isolated installations in certain parts of Canada have been accepted by the Underwriters in spite of defects, it has to be borne in mind that in a territory so wide, and with so much work being begun in pioneering and primitive fashion, the most efficient inspection is not always possible.

In view of the foregoing, and especially bearing in mind that the National Board of Underwriters, while it is a business organisation, and will do nothing to lower its high reputation as a judge of safety in respect to fire hazard, is prepared to receive whatever representations we may have to make from the British point of view, adopting suggestions wherever practicable, we think that the way is cleared for a better understanding of the Canadian trade position, and for a further well-planned effort on the part of our manufacturers to establish themselves strongly there.

Half-watt Lamps.

The question whether "half-watt" lamps of small candle-powers are on the market in Germany has been raised more than once in our columns of late; but we believe the contradictory statements that have been quoted arise out of nothing more than a lack of definition, resulting in misapprehension on one side or the other. It is well known that nitrogen-filled lamps can be made in very small candle-powers, with fairly high efficiencies, for low voltages, and they are, in fact, on the market in this country; the great question, however, is whether they can be made for pressures upwards of 200 volts, with candle-powers not exceeding 50 c.p., and at an efficiency of half a watt per candle. The answer, we believe, is in the negative.

It is true that the A.E.G. is advertising "half-watt lamps" of 50 to 200 candles, but the 50-candle lamp burns at 14 volts only, necessitating the use of reducing transformers on A.C. circuits, and preventing the adoption of the lamps in houses supplied from D.C. public mains. The efficiency and life of the smaller sizes are distinctly inferior to those of the larger ones. It is interesting to see history repeating itself in this way; it is but a few years since the boom of auto-transformers to enable tungsten lamps to be adopted took place here, and many of the installations then fitted with transformers still have them in use. Now the transformer is again required—but for a still lower voltage, necessitating the purchase of a new one; and this time the reduction of pressure is so great that, in spite of the increased efficiency of the lamps, the current required at the low voltage is far greater than before, and the existing wiring is likely to be much too light to carry it.

But the need has not yet arisen in this country, as a supply of the lamps in question is not available here, and, though increase in efficiency must unquestionably benefit the industry in the long run, it is not desirable that the improvement should take place too quickly. We think supply engineers have no need to worry at present; the half-watt lamp for domestic use is not yet in sight.

While "one-watt" and "half-watt" lamps are commonly spoken of, it should be borne in mind that these are only rough approximations to the truth, even when the "hefner" is in question (0·9 C.P.); the actual consumptions are nearer 1·2 and 0·6 watts per candle, in the horizontal plane.

The Copper Situation.

Really although the copper position is not so bad, there is not much apparent to encourage high hopes as to the chances of prices advancing materially in the near future. Taken altogether there has been quite a gratifying degree of steadiness in the market, but not sufficient to impart any real feeling of confidence to consumers whose attitude is still one of very modified enthusiasm, and whose purchases are strictly limited to the satisfaction of pressing needs. For some time now the trend of statistics has been against holders of copper, and the last American details afforded little encouragement to the bulls, though, rather strange to say, the publication of the returns was actually followed by an advance in prices. This was because the reduction in the month's output, compared with April, was heralded as being the forerunner of a move for the concerted diminution of production at the largest United States mines. In a way there is nothing amiss with the situation, and prices can hardly go much lower, but all the same there is no reason to look for much improvement yet awhile. There is, moreover, the possibility of a small further reduction in prices unless some definite turn for the better is to come to the rescue of the market, which can only, it would appear, be through an extension of buying by the consuming trades. It may be taken for granted that at current prices many mine-owners are inclined to check output rather than continue it on a heavy scale. It is only natural that there should be a disposition to husband ore reserves, pending a more favourable opportunity than that at present available for finding a market for copper. There is no doubt that the larger producers are not too much enamoured of the situation, for they have latterly again been shading the prices of refined metal, while it is doubtful if they have succeeded in clearing off any important quantity. The trade doing in the chief European centres has certainly not been much stimulated by the price reductions which have been put into effect, and although it is reported on somewhat vague authority that things are a little better in the United States, it is pretty certain that there has not been any development of demands upon a scale justifying anticipations of an early sharp upward movement in prices.

The tendency of stocks to accumulate is unmistakeable of late, the increase being apparent on both sides of the Atlantic, and it will require a very clear stimulus to trade to reverse the prevailing conditions. True, the increase in the stocks is not very large, but speculation is quick to note tendencies, and the persistent move in the direction of greater ease in this respect cannot be expected to pass unheeded. The total surplus stocks in Europe and America have gone up about 15,000 tons during the last three months, from 55,500 tons at the end of March, to 70,600 tons at the end of May, but the total at the latter date is only 5,000 tons in excess of the quantity held at the end of January, when cash copper stood at about £66 a ton. The increase since the beginning of the year is thus pretty well discounted in the reduction which has already taken place in the price. The world's visible supply, too, is practically the same as it was at the end of last year, when the price was about £65 a ton. The generally poor trade advices from all parts, and the very unfortunate position of things recently on the Stock Exchange have, no doubt, had something to do with the slackness, and with a revival of hope in share circles, there is no doubt that copper would undergo a moderate improvement. Possibly a move in this direction may be seen soon. Failing this, however, the market seems destined to slip back a little further for a time.

F.O.B.

The cruise of Mr. and Mrs. Hobhouse with their niece and other friends in His Majesty's telegraph ship *Monarch* to Scotland, at their country's expense, is not to be taken too seriously. It is one of those little incidents insignificant in themselves that might easily be passed over, were it not that they serve to give the public the measure of the men to whom the Empire entrusts its destinies. From time immemorial, so far as the present generation is concerned, cable ships have been famed for their hospitality and good cheer. So long as this hospitality is extended by private owners, it is, in general, beyond criticism, and in some noteworthy instances it has conferred untold benefit and happiness upon our countrymen and upon others doing service at remote and rarely visited foreign stations. His Majesty's ships, in like circumstances, are renowned throughout the world for similar hospitality, and it would be foolish in the extreme to advocate any lessening of this direct aid to a good understanding between the nations. The mischief begins when the hand of hospitality turns not outwards but inwards, and it is most nasty when those who condescend to this form of irregularity are those who control and who are paid to keep matters straight.

An article in the *Evening News* a few days ago contained what was described as an official statement regarding this cruise, from the private secretary of the Postmaster-General. In this account of the proceedings it is first of all denied that the cruise was in the nature of a pleasure trip. The defence is that the Postmaster-General was at work the whole time. It is admitted that the party landed several times to play golf and to fish, but it is contended that this did not interfere with the movements or the work of the *Monarch*. This is a very ingenious upholding of the virtue of Mr. Hobhouse, but the fact that he was at work is not in itself conclusive. It requires to be shown that he was engaged upon a task directly associated with cable-laying or repairing, and that his work in the *Monarch* could not have been carried out on shore. If cable work was proceeding the whole time, the occasion was scarcely one suitable for the presence on board of Mrs. Hobhouse and her niece. In brief, the exploit is not what in ordinary parlance could be called a clean potato. In his recent speech at the London Chamber of Commerce he said that his department were always watching with the hope of making any improvement they could. He declared also that while his department had a duty towards the public, the public had some duty towards the department. The *Monarch* incident may suggest, perhaps, just the kind of improvement for which the department has been watching. It certainly affords precisely the kind of example, defining departmental and public duty, required for the Postmaster-General's next speech.

D

Public Servants and the House of Commons.

In the course of the Post Office debate last week, a matter was raised which well deserves the attention of the public. The Member for Brentford, who supports the Opposition, said in relation to the redress of certain grievances from which Post Office servants are alleged to suffer, "the present system of putting pressure on Members of Parliament cannot go on." The Member for the Spen Valley Division, a supporter of the Government, was still more emphatic. He said: "This discussion is largely electioneering and vote-catching, and is brought about by pressure. I do not complain that Post Office employés should use their only remedy, but all parties should resolve to get rid of this lobbying and circularising. With the increasing number of Government officials in the country, it is a serious matter that numbers of electors should give their votes, not on national issues, but on the conditions and terms of their own employment."

The pronouncement was received with acclamation, and we are glad to note that the Government decided to free the members from political pressure by appointing a special tribunal outside the House to deal with the questions under discussion. The Member for the City of London suggested, in an aside, that all persons holding appointments under Government should be disfranchised. Such a proposal may not be within the bounds of practical politics, but we are persuaded that it represents the views of a large number of people.

We have never lost an opportunity of calling attention to the undesirability of allowing municipal servants to enjoy the municipal franchise, and the fact that servants of the Post Office are endeavouring to influence Parliamentary opinion for the purpose of securing better hours, or better wages, shows that they ought not to be allowed to vote. They have shown that their interests are in conflict with their public duties. Nor does it appear to us that the agitation for better terms to postal servants is very meritorious in itself.

If half the paid appointments in the gift of the Postmaster-General were declared vacant to-morrow, there would be scores of applicants for each individual job. Yet, by their weight of numbers, it seems that the servants of the Post Office can exercise a considerable degree of control in Parliament.

A Merchants' Association in Germany.

The Electrical Merchants' Association, of Frankfort-on-Main, which was formed in that city in 1910, has local or district branches in Berlin, Nuremburg, Hamburg, and in Saxony.

Its object is to secure the combination on an economic basis of all the merchants in Germany, either as representatives or as retailers. For this purpose the Association seeks the adoption of measures against the granting by local authorities of privileges to certain large firms in the form of monopolies in the supply of materials or in installation work; the securing of representation and voting power in the Committees of the Verband Deutscher Elektrotechniker; the conclusion of arrangements with manufacturers and combinations of manufacturers with respect to common conditions of contract; or eventually the adoption of joint action against manufacturers as well as installation contractors for the protection of any member of the Association who is not at fault in cases of dispute. In addition, the Association aims at the regulation of sale prices, the removal of excessive competition, the purchase of materials on joint account and the joint announcement of increases in sale prices. The Association has, so far, been able to enter into friendly relations with the Installation Contractors' Syndicate and the Buying Association of the Installation Contractors; the trade contest between individual members of the Association has been brought into a worthier course, and its neutral attitude is said to have caused the original mistrust of manufacturers to disappear.

The I.M.E.A.

The thoughtful address with which Mr. R. A. Chattock opened the proceedings at the Convention of the I.M.E.A., which is now in session, deserves the careful attention of all who are interested in the future of the electrical industry. Approaching some of the great questions which are pressing for solution with judicial caution and impartiality, Mr. Chattock summed up the situation and announced his considered opinion in each case with decision and finality. The first part of his address related mainly to the things that are; the second to what may be in the future.

Dealing first with the former, we note with interest a feature which stands out in several relations, although not explicitly emphasised by the President—it is the unfortunate, if not disastrous, result of deferring too far to the idiosyncracies of a small number of persons on either side of a controversy. That everyone has a right to hold and to express his own opinion, we willingly agree; but that he should endeavour to force his views upon his fellows, or that the latter should too readily submit to his persuasion, we do not believe—the will of the majority, tempered by due regard for the interests of all, ought necessarily to prevail.

As a case in point, we cite Mr. Chattock's comments on the failure of the M.E.A. to arrive at an agreement with the B.E.A.M.A. last year; the Council's recommendations were rejected owing, we believe, to the strong views held by a few of the members. The result was that the Model General Conditions of Contract of the I.E.E., issued a few months ago, have obtained general acceptance, and are likely to become firmly established, while the M.E.A. is apparently as far from agreeing with the B.E.A.M.A. as ever. In passing, we may compliment the Council of the Institution on this admirable example of effective action in a purely industrial matter, which might well be followed by similar work in other parts of that great field.

Again, Mr. Chattock deplores the failure to arrive at an agreement with the Electrical Contractors' Association, due to the irreconcilable views of a few extremists on either side, which has resulted in the resumption of the Parliamentary conflict.

As a third instance, we refer to the fate of the Industrial Committee of the I.E.E.; Mr. Chattock expresses no personal opinion on this matter, though it is easy to read between the lines of his address, but that the dissolution of the Committee was due to the strong views of a few influential members of the Council, we think, will not be disputed. It will be noted that Mr. Chattock advocates the formation of a Central Association to represent the industry in general, and, in fact, to discharge the functions for which the Industrial Committee was originally appointed, and he puts forward a definite proposition which may well afford a satisfactory solution to the problem.

Turning to the second part of the address, we think the President's objections to the joint management of gas and electricity supply undertakings will be endorsed by every member of the Association; unfortunately, he did not refer to the possibility of technical co-operation between the two industries, which raises entirely different questions for discussion. But by an easy transition he came to what we may call his "pet subject"—the centralisation and nationalisation of electricity supply throughout the country—on which his views agree in the main with those put forward by Dr. Ferranti three years ago. That the concentration of generating plant is the true path towards the attainment of the ideal of electricity supply at bed-rock prices is not open to question nowadays; but the mode by which that end shall be attained is not so readily decided. State ownership is notoriously inefficient and uneconomical; but the other alternatives mentioned by Mr. Chattock are recognised as feasible and advantageous, and the tendency of expert opinion is decidedly towards one of these. We are glad to note that Mr. Chattock reassures those engineers who might oppose this policy for their own safety; self-preservation is the first law of Nature, and we do not blame them for its exercise, but we are certain that they need have no fear.

Mr. Chattock's views so largely coincide with those which we have put forward in these columns that we may be excused if we express the pleasure and satisfaction that we have derived from the perusal of his address, and the hope that his views may commend the approval of all who read it.

THE MUNICIPAL ELECTRICAL CONVENTION.

Birmingham was in its brightest mood when the 19th annual Convention of the Municipal Electrical Association opened its proceedings in that city on Tuesday last. Upwards of 500 members and visitors are attending this year's meeting, which embraces a most strenuous round of visits, interspersed with debate and entertainment, the latter commencing with an informal reception and smoking concert on Monday evening.

The Lord Mayor (Lieut.-Col. Martineau) briefly and cordially welcomed the visitors at the Midland Institute on Tuesday, and subsequently Mr. R. A. Chattock, Birmingham's city electrical engineer and this year's President, delivered his inaugural address.

With the latter we deal at length elsewhere; it is sufficient to say that it covered a variety of matters of moment to electrical suppliers, and met with the cordial approval of the meeting, whose thanks were voiced by Ald. Bruce (Sunderland), and Mr. Harry Richardson (Dundee). Then followed Mr. Vignoles's paper on "The Commercial Development of Electrical Supply in Towns of Moderate Size," of which we give an abstract elsewhere, the discussion will be reported in a later issue.

Mr. Vignoles deals clearly but concisely with a very big subject—the paper, in fact, extends much beyond the usual limits, and will well repay the close perusal which some of the speakers in the discussion unluckily admitted they had not given to it, thereby incurring the wrath of a worthy alderman who takes such matters seriously.

The discussion showed the tendency which exists towards co-operative development of electricity supply and the need for some representative controlling force behind the movement.

At the conclusion of the morning's discussion, the visitors adjourned to luncheon at the Grand Hotel, at the invitation of the Birmingham Entertainments Committee.

The toast list was a brief one, but it cannot be passed over without some reference to the enjoyable speeches of Bailie Willock in proposing "The City of Birmingham," and of Alderman Bowater in replying to the toast.

The afternoon was given up to visits to the works of the General Electric Co. and Messrs. Belliss & Morcom, some reference to which appeared in our last issue.

It may be here mentioned that a representative party of members of the Press were, through the courtesy of the General Electric Co., enabled to make a complete tour of the company's works at Witton, and of the Ileene Works, on Monday, when every department of these works was thrown open to inspection.

During Tuesday afternoon a demonstration of electric vehicles was held at Witton. Wednesday's proceedings were held at Coventry, Thursday's at Stratford-upon-Avon and Warwick, and to-day the annual general meeting is taking place at Birmingham.

The Annual Dinner.

At the annual dinner, held on Tuesday evening, after the usual loyal toasts, Ald. Bruce (Sunderland) proposed the toast of the "City of Birmingham," the Lord Mayor (Lieut.-Col. Martineau) responding in suitable terms.

Dr. S. Z. de Ferranti proposed the toast of the "Incorporated Municipal Electrical Association," emphasising the especial pleasure which it gave him to perform this duty. If he could give them any advice, it would be to keep the Society a "live" one, and that the members should exact from the Council due regard for their interests. He went on to refer to the disappointment of the Industrial Committee of the I.E.E., of which so many of them were members. Part of the work of their Association should be to educate the public to the use of electricity. A few years ago he had outlined his ideas as to the universal use of electricity, a matter which had been referred to by the President. They did not agree, perhaps, in the methods to be adopted but their ideals were similar. When it paid to employ electrical methods it would come about. He had previously given his opinion that it would not pay to carry out the idea until they could get at least 25 cent. of the energy out of the coal in the form of electricity.

The President (Mr. R. A. Chattock) in responding expressed appreciation of Dr. Ferranti's remarks. His experience of the Association was that every endeavour was made by the Council to further any desirable object. The Convention was only an interlude in the work of the Association, which continued throughout the year. He concluded by thanking them for their hearty reception of the toast.

Mr. J. F. C. Snell, in proposing the "Electric Supply Committee of Birmingham," referred in complimentary terms to the extraordinary growth of electricity supply in the city and the efforts being made to cope with it. He looked forward to a great expansion of the supply when the advantages of the Corporation's new power station were realised. It was necessary to look at the matter from its broader and more national aspects; the cheap supply would benefit the Birmingham manufacturers in their competition in the markets of the world. Councillor Ellaway (chairman of Birmingham Electricity Supply Committee) replied.

Mr. H. Richardson proposed "Our Guests," in felicitous terms, the Mayor of Stratford and Councillor Lee (Coventry) replying.

Presidential Address.

Mr. R. A. Chattock expressed his regret that the contentious clauses in the model general conditions had not yet been agreed between that Association and the British Electrical and Allied Manufacturers' Association. A set of model general conditions had been issued by the Institution of Electrical Engineers without the approval of their Association, and these Institution model conditions, which were at variance with their ideas in many respects, were now being put forward by manufacturers with the authority of the Institution behind them, and buyers were being obliged to accept them without much hope of negotiating alterations in them. He felt that a very different result, and one more favourable to them, would have been obtained if members of that Association had adopted the carefully-considered recommendations of the Council 12 months ago.

Negotiations were opened with the Electrical Contractors' Association to try and get them to withdraw their opposition to the Electric Lighting Bill, 1914, in order that the Bill might go through unopposed. It was ascertained that many of the contractors were in favour of withdrawing opposition, but eventually the opposition element in the Contractors' Association was successful, probably due to the action of those who were opposed to wiring being carried out by municipal supply authorities under any circumstances whatever.

He believed the contractors exaggerated the quantity of work that it would be possible for a municipality to undertake. They sought these powers not for the purpose of securing more trade, but to ensure good work, especially in the cheaper classes of installations. The expensive work in hotels and good-class business houses and residences, which was well paid for, was, as a rule, well done. Moreover, there was the wiring work for telephones and bells which the contractors must obtain, because the municipality had no power to do it, and did not seek such powers, with the result that a customer would probably prefer to place the whole order with one person instead of two. In addition, the contractor could calculate the profit on the whole combined order, and he could probably successfully compete in price with the municipality. With the cheaper work, the case was entirely different; the margin of profit was so small that the quality of the work often suffered, and the men who did it, as a rule, were not worth going for if trouble resulted. It was this jerry work that they wanted to eliminate.

The idiosyncrasies of a few engineers, and possibly also of a few contractors, should not be allowed to interfere with the well-considered policy of their Association in putting forward a scheme that all supply engineers, and, he believed, all broad-minded contractors, considered to be in the general interests of the industry. He sincerely hoped that a satisfactory agreement would be shortly arrived at. It was unthinkable that supply undertakings could do without electrical contractors.

Considerable progress had been made during the past few months in developing the adoption of the electric battery vehicle in this country. Demonstrations had been made in several towns, and working trials were being arranged for over extended periods. It was only by bringing and keeping these vehicles before the public that interest would be aroused in them, and for this purpose he considered that supply undertakings should be prepared themselves to bear some of the cost. Demonstration vehicles could quite well be used by municipalities for many of the operations that had to be carried out by them, and money spent in pioneering work of this kind would amply repay the supply undertaking. It also gave confidence to the public when they saw the vehicles in service, and it enabled first-hand figures as to cost of operation to be given to prospective users. In a large city many thousands of pounds of revenue would be obtained annually from the use of these vehicles when their adoption became general.

Up to the present, the expenses incurred by the Electric Vehicle Committee had been met out of the funds of the Association. The Committee estimated that during the coming 12 months their requirements in this respect would amount to about £200, and, with a view to meeting this expenditure, they were approaching the various municipal electric supply undertakings with a request that they should each contribute from one to three guineas towards this fund. They had also approached the manufacturing firms and others interested commercially in the movement, and had been met by a very liberal response.

Referring to the dissolution of the Industrial Committee of the Institution of Electrical Engineers, Mr. Chattock said that the report of the Council made it clear that the Industrial Committee felt that under their existing constitution and powers they were not in a position to perform useful work.

As a member of the now defunct Committee, he explained that they recognised that in all industrial concerns, differences of

opinion must arise on matters of policy and detail, and the same thing applied to the operations of the various existing associations, which were bound to come into conflict with each other at times. Such points of disagreement were usually settled by meetings and discussions between the associations concerned. Occasionally, however (as in the case of the present disagreement between themselves and the Electrical Contractors' Association over the wiring clauses), disagreements arose which it appeared almost impossible to settle. The Industrial Committee felt that a case of this kind was one in which they should be in a position to assist, and, if necessary, offer to arbitrate, and, in view of their not being able to do this under their constitution, they felt that some body should be called into existence which would be capable of offering its services in such an eventuality.

He was of the opinion that all the associations connected with the electrical industry (and there were many of them) should form from their members a central association, which could arrange conferences to consider disagreements between individual associations, and, if necessary, arbitrate upon the same, and which could be called together by any individual association requiring support in its operations, whether political or industrial. It rested with the various associations themselves to form such a body, and if it were called into existence solely for this specific purpose, there was every reason to believe that it would be of inestimable advantage to all branches of the industry.

He thought that the many and varied interests represented on the Council of the Institution, which interests were largely individual and not really representative of the various associations, rendered it impossible for the Council to deal with disagreements between individual associations in the way that a body such as he had outlined could.

In an address given by Mr. J. J. Newbigging as president of the Manchester District Institution of Gas Engineers, at their annual meeting held in March last, Mr. Newbigging touched upon competition with electricity, and, coming as they did from the chief gas engineer to the Manchester Corporation, his remarks provided ample evidence that gas undertakings were beginning to fear the competition of electricity.

The real reason why electricity had been coming to the front so much faster than gas was undoubtedly the great reduction that had been made in the average price at which electricity was now sold to the consumer as compared with gas. In the year 1901 the average net price of gas in Birmingham was 26·68d. per thousand cb. ft. In the year 1914 this had dropped to 19·41d. per thousand cb. ft., a reduction to the consumer of 27·3 per cent.

In 1901 the average price received for electricity per unit was 4·37d. In 1914 this had dropped to 1·15d., a reduction of 73·6 per cent.

Mr. Newbigging suggested a combined control for municipal gas and electricity undertakings; he was glad to have this opportunity of joining issue with him at once.

He was of the opinion that the single control of gas and electricity undertakings would have exactly the opposite effect to that outlined by Mr. Newbigging. It would mean the total suppression of competition, and would create what he considered would be fatal to the interests of the consumer, namely, collusion. Instead of tending to foster keen rivalry between the two departments, it would effectually destroy that desire amongst the staff to improve upon previous records that was such an immense factor in the success of these public supply undertakings. Fair competition must always have a stimulating effect on industrial concerns, and to stifle this would be to deprive the ratepayer of the only real guarantee that he had for the most economical administration of both departments.

The charge that prices for current were sometimes cut down to an unjustifiable figure to secure business could not be substantiated.

The sale of gas was largely controlled by the amount the undertaking could obtain for its by-products. This amount was frequently greater than the gross profits earned during the year. The electricity department had no by-products to sell except the useful employment during the hours of small demand of the generating plant and underground distributing mains, which had been purchased to supply the maximum load demanded during the winter months, that was to say, cheap current with a high load factor, and low quotations for current of high load factor were perfectly justifiable under these conditions. They were not given with the sole object of securing business, but to reduce the average cost of giving the supply, to the benefit of the whole of the consumers.

He maintained that it would be impossible for one manager and one committee to work both departments in the interests of both classes of consumers. A man must become biased to a certain extent in favour of one or other of the branches of the supply, and it would be practically impossible for him to give an unbiased recommendation to his committee on a point involving, for instance, the development of some new area, as to whether this should be carried out by gas or electricity.

Consumers would resent being told that they could only have one or the other, and such a policy would undoubtedly have the effect of driving manufacturers and others away from the city, whilst it was more than likely that the Board of Trade would be inclined to admit outside competition from power companies if they found that the statutory obligations for giving a supply were not being properly carried out.

To his mind there was no evidence whatever that the existing methods of single control of both gas and electricity undertakings had been unsuccessful. There was a field for both of them, as was shown by the increased outputs of both that were recorded year by year, and until such evidence was available, single control should not be considered.

If centralisation ever came—and it would be greatly to the advantage of the users that it should—it was obvious that it would be quite impossible to arrange for single control of two industries, one of which was purely local and limited to comparatively small and isolated areas, whilst the other was national and capable of being applied over the whole of Great Britain as one concrete system of supply.

For some years past the question of bringing isolated electric supply undertakings under one central system of supply had been occupying the attention of electrical engineers, especially in London. In the provinces, too, the larger municipalities had been extending their boundaries, and incidentally taking over the electric supply undertakings belonging to the areas incorporated, with distinctly beneficial results to themselves and to the areas taken over. Parliament had also recognised the principle by agreeing to the formation of the various power supply companies which were operating in several counties.

All these were steps in the right direction, though they were as yet a long way off the goal—where it would be possible to obtain, all over the country and at one rock-bottom price, a supply of electrical energy for any purpose, such as power, heating, lighting (and this would ultimately be such a small percentage of the whole that the poor load factor could be safely ignored), domestic requirements, traction by rail, road, or tramway, &c.

The provision of cheap power and cheap transit for both goods and workmen was a most important consideration.

The larger municipalities in this country had pointed the way—now it remained for Parliament to tackle the question of nationalisation; whether by means of a Government department or a Public Board of Management, such as the Port of London Authority, or a private company, subject to limitations as to dividends and prices to be charged for current supplied, was yet to be seen.

Until some such scheme was brought into operation, it was useless to expect any marked reduction in the cost of producing and distributing electrical energy below that obtaining in the large power stations now operating in this country. It was only by tackling the problem boldly, by being prepared to supply current at prices much lower than were ruling at present, and recognising that for a few years there must necessarily be a deficit on the large initial expenditure incurred, that it would be possible to attract and develop the large volume of business that would be necessary to make such a scheme a financial success in the future.

Large bulk supply power stations should be installed in various parts of the country, having regard to the three following chief requirements:—

Proximity of an ample quantity of coal.

Proximity of an unlimited supply of water for condensing purposes.

Proximity of the various large centres of industry where the major portion of the energy was likely to be required.

As soon as these bulk supply stations were available and the distributing trunk cables installed, the majority of the small generating stations in the country should be at once shut down and utilised as sub-stations.

It would probably be concluded that when all these stations were shut down the engineers in charge of them would not be required; but it would be the worst possible form of so-called economy to dispense with the services of a single man at present employed in all these undertakings. The very object of the scheme was to increase enormously the business to be handled in all these centres by giving the supply at a much more attractive price. The men on the spot had the best knowledge obtainable for pushing the business and developing the distribution of the bulk supply that they would receive, and the chief engineers in charge would be especially valuable in this direction. The electrical engineers had to be managers of their businesses as well as engineers in charge, and the business control was every bit as important as the engineering control. The commercial side of the business was so dependent upon technical matters that it was necessary to have an engineer at the head. He did not see, therefore, that there need be any apprehension in the minds of the existing engineers in charge that they would not be required if such a scheme came into being.

The main distribution should be carried out wherever possible by means of overhead trunk mains, and provision should be made for reasonable wayleaves to be compulsorily granted. Without special powers regulating the granting of wayleaves, it was probable that the cost of obtaining them would very nearly kill the saving of overhead trunk lines compared with underground cables.

The cast-iron boundaries of existing municipalities and companies would entirely disappear, and development could go on freely and along lines most beneficial to the community in general.

There was no reason why the London scheme should not be developed as part of a large national scheme such as he had indicated.

He suggested that as this scheme was so vitally important to all industrial centres, in their own interests the large municipalities, which at present controlled the major portion of the bulk supplies in the provinces, should meet together and discuss the matter, and, if possible, formulate a satisfactory scheme which could then be brought jointly before Parliament, to be subsequently developed on proper commercial lines.

The justification for this method of procedure was the supply of electrical energy for all purposes, whether industrial, domestic, or public utility, at a price far below what was now being paid:—

(*a*) For the benefit of the community as a whole.

(*b*) For enabling our manufacturers to compete successfully with their rivals abroad, who were developing their resources on these very lines.

(*c*) For the abolition of smoke in our large cities, and the consequent general improvement in the health of the community.

(*d*) For the conservation of our coal supplies, which would be utilised on the most economical lines at present known to science, and

(*e*) For the upholding of our position as the leading country in the world of commerce, which position was being assailed more and more every year.

Some Notes on the Commercial Development of Electricity Supply in Moderate-sized Towns.

(*Abstract of paper by* W. A. VIGNOLES, *Chief Electrical Engineer, Grimsby.*)

To market the commodity it must be brought to the notice of the people who are likely to buy it, and this may be done in any of the following ways:—

(1) Showrooms, where electric fittings, heaters and cookers can be seen in use; (2) periodical exhibitions or demonstrations serving the same purpose; (3) advertising; (4) personal canvassing.

Where, as in Grimsby, the undertaking has no special powers, and arrangements have to be made to sell through contractors, only a small proportion of the cost can be covered by the profit on sales, and the writer is convinced that under these circumstances the same results can be obtained in other ways at less expense. This view is based on experience in other towns; for instance, the engineer in a town of about 100,000 inhabitants stated recently that his showroom cost him £600 per annum excluding canvassing staff; in Grimsby excellent results have been obtained by advertising, with considerably less expenditure, as the following figures will show:—

Year.	1908-9.	1909-10.	1910-11.	1911-12.	1912-13.	1013-14.
Amount spent in advertising	£20	£48	£177	£335*	£263	£250
Increase in private consumers	102	106	203	168	230	315
Increase in revenue from supply to private consumers only	£38	£869	£1,242	£1,062	£1,864	£2,144

*This includes nearly £100 spent on demonstrations, exhibitions and showrooms.

All of the following advertising methods are used:—(1) Advertisements in local newspapers; (2) enamelled iron plates on works using power; (3) enamelled iron plates on the lamp-posts in the streets; (4) posters in selected positions on Corporation property; (5) personal facsimile letters; (6) church and chapel magazines and bazaar catalogues; (7) exhibitions and demonstrations; (8) pamphlets and leaflets; (9) issue of magazines—advertising electricity for works and for the home respectively; (10) loaning apparatus for trial; (11) canvassing; (12) issue of a consumers' guide.

On a turnover of £20,000 to £24,000 the cost, which has averaged about £250 per annum, cannot be considered extravagant.

The writer suggests that the I.M.E.A. should appoint a Committee with full powers to confer with the Electricity Supply Publicity Committee or any other body, to endeavour to formulate some scheme by which a co-operative system of publicity could be put on foot for the benefit of electricity supply generally.

A difficulty in the way of a large combined municipal scheme of advertising, is that in a number of towns both electricity and gas are in the hands of the Corporation, but there does not appear to be any gas undertaking in the country that has seriously suffered from the competition of even the most energetic electricity supply authority.

Exhibitions and demonstrations are very useful in stimulating interest, and should be held from time to time, especially when any development comes along that it is desired to bring to the notice of the public; but the cost is heavy, and they should not be held too frequently, otherwise the appeal is likely to lose its force.

Every undertaking of the size under consideration should employ an engineer as canvasser or representative, devoting the whole of his time to following up inquiries and canvassing. If systematic advertising is carried out it will be found that one man will be fully employed in following up inquiries.

With large power consumers the personal efforts of the manager will nearly always be necessary before the business is settled.

Arrangements should be made with the borough surveyor to supply the department with the names of persons who have submitted building plans for approval, and to give particulars of any new roads or estates that are being laid out; and strenuous efforts should be made to induce the speculative and other builders to wire new houses.

The Grimsby E.L. Department offers free advice to all consumers, and for a small fee, 2½ per cent. on the value of the work with a minimum of 5s., undertakes the preparation of a specification of what is required, and superintends the carrying out of the work.

Alternatively, any consumer can obtain free of charge an outline scheme for the lighting of his premises.

These schemes and specifications are prepared under the manager's supervision by a special assistant (who may be called the consumer's engineer) well up in illumination problems, and are worked out on scientific lines.

When new devices or apparatus are placed on the market, the Department purchases a few examples and lets consumers have them on loan for trial.

Some years ago the Grimsby Electricity Committee met the local contractors, and after discussing the question of hiring with them, a friendly arrangement was come to by which the Department hires out:—(1) Motors and starting apparatus; (2) arc lamps; (3) cookers; (4) heaters, and (5) provides installations and apparatus on hire-purchase.

All wiring work is done through a contractor, and no apparatus is hired out that is of less value than £3 10s.

In many cases the Department takes over the hire-purchase of apparatus or installations provided and arranged for by contractors. In these cases the profit is shared between the contractor and the Department.

It is of the greatest importance that consumers should be induced to adopt electricity for all purposes, and everything possible should be done to make it easy for them to do this by the hire, supply on hire-purchase, or loan for trial of all kinds of apparatus.

Installations on a rental basis can be given equally well by placing the actual work in the hands of a contractor, the Corporation merely doing the financing.

In such cases it is advisable to combine the charge for the hire of the wiring with the fixed charge of the rateable value system if electricity is supplied on this basis.

Sufficient has almost been said to show that it is possible to adopt a forward policy and to successfully develop the business of an undertaking without the help of a sales department.

If an undertaking is to progress satisfactorily there must be no hesitation on the part of the committee in spending the money required for extensions of mains to reach consumers. A guarantee should not be asked for unless there is a strong probability of the undertaking losing money by giving the supply and it is felt that it would be better to be without the consumer; but in coming to a decision the possible developments in the next few years should be borne in mind.

In Grimsby a very large length of $\frac{7}{16}$ 3-core distributor has been laid and has given excellent results in providing for extensions in streets where there are numbers of small houses.

In Grimsby supply is being given to consumers at present whose annual bill only just reaches 80s., while with slot meters many consumers are paying less than this. With such a small revenue it is extremely difficult to meet all charges.

By standardisation and by adopting a system of looping services running one cable for each pair of houses, the average cost per service has been steadily reduced from £3 19s. 10d. in 1906-7 to £2 17s. in 1912-13.

Suitable methods and rates of charging must be adopted to induce consumers to generally adopt electricity for heating, and, in the writer's opinion, the most suitable method will be found to be the rateable value or Norwich system, with the running charge not above ½d. per unit.

With the smallest consumers, and in premises where the tenant is likely to change frequently, it is very desirable to use slot meters; the revenue that has been obtained in Grimsby from these in the last few years has been as follows:—£383 (1914), £270 (1913), £201 (1912). The meters have been arranged for 5d. per unit, but when the meter is cleared 2d. in every 1s. is returned, so that the net cost is about 4d. per unit, instead of 3¾d., the usual flat rate.

In Grimsby, with a 1d. rate, and without any appreciable number of heaters being let on hire, the sales for heating and cooking have amounted to £206 (1912), £294 (1913), £324 (1914).

Cooking suffers at present under the disadvantage that the only suitable apparatus is too expensive for the small householder to buy, while it is difficult to get consumers to pay 15s. per quarter for cooking apparatus when they can hire a gas cooker for 3s. 6d.

If a number of undertakings were to combine together, and adopt a particular make of cooker, they should be able to buy on better terms.

The writer hesitates to recommend that the I.M.E.A. should appoint another Committee on this question, but a precedent is to be found in the establishment of the Committee on electrical vehicles, which appears to be doing work which could not possibly be done by any single undertaking.

The second part of the paper deals with financial management, in regard to which the only sound policy is to place the whole control of the undertaking under one supreme head, who should be absolutely responsible to the Committee for the success of the undertaking. Where accounts are kept by the borough treasurer, difficulties occur, because the staff is not in touch with the working of the undertaking.

Mr. Pearce's suggestion that a limit should be placed by Parliament on contributions to the rates, would strengthen the hands of Committees who are anxious to protect the assets of an undertaking.

The policy of devoting all profits to the undertaking is the soundest and best for the district.

The best way to raise capital is by borrowing on mortgage on the district rate, and the usual method of repaying a loan is by an annuity equated to give equal payments on each year's working.

Adequate provision must be made for depreciation by reduction of capital or in some other way; allowance must be made for obsolescence, which complicates the question of the amount to be provided. A reserve fund may be called on for supplementing revenue, and a margin must be allowed over the calculated depreciation figure for this contingency.

In the Grimsby accounts the depreciation fund is represented by repayment of loans, revenue contributions to capital outlay, reserve fund and sinking fund.

Where loans are redeemed on the equated payment system, the amounts shown as actually repaid are not a true criterion of the provision made for depreciation. In Grimsby the loans actually repaid and accrued, as shown in the 1912-13 accounts, were £24,570, but the proportion of loans provided for (on which depreciation should be based) works out at £33,661.

In Grimsby the difficulty of finding working capital is got over by not investing the reserve fund, but leaving it in the ordinary

banking account. If a bank overdraft were obtained, interest at 5 per cent. would have to be paid, while the reserve fund, if invested, would only earn about 3½ per cent.

The third part of the paper considers cost of supply. The writer is of opinion that electricity should not be sold on the basis of what it will fetch on the market, unless this will so reduce costs that ultimately a profit will be made, or will induce other business on which losses will be made up.

In any undertaking over a period of years the costs really follow a definite law as long as conditions remain the same. This law is that the total cost of generation per annum, not cost per unit, is equal to (*a*) a fixed sum plus (*b*) a small running cost per unit sold.

This is clearly shown by the diagram (fig. 1), which shows the amounts spent at Grimsby on generation during years when con-

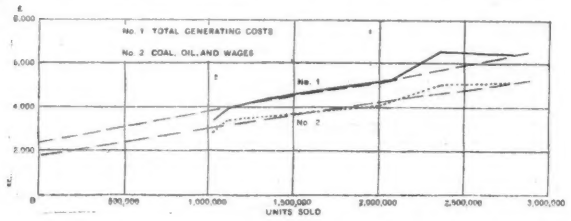


FIG. 1.

ditions were fairly uniform. No. 1 straight line lies fairly among the points; the formula for this is £2,450, plus ·341d. per unit.

No. 2 line is drawn through points plotted for coal, oil and wages.

Fig. 2 shows coal, oil and wages, plotted for four towns: the curves agree, allowance being made for a probable lower cost of coal at Grimsby.

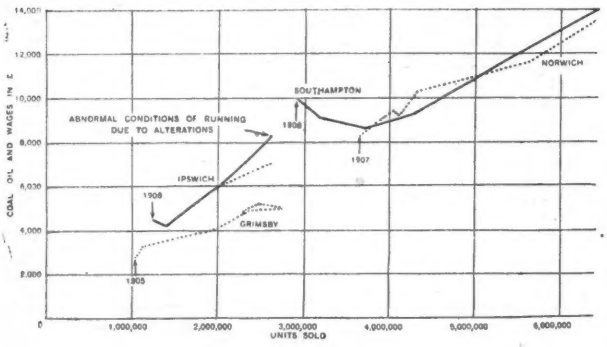


FIG. 2.

The only satisfactory way to allocate standing charges seems to be to take them in proportion to the maximum demand. All distribution costs are standing charges; the amount does not depend on units sold, but on the extent of mains laid and breakdowns in the year.

Management expenses do not depend on units sold (the author cites the case of Grimsby), but fig. 3 shows that management

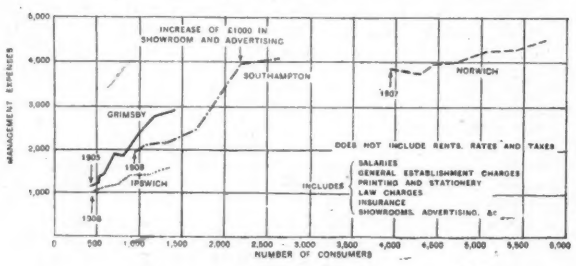


FIG. 3.

costs depend to some extent on the number of consumers; where conditions are uniform, the costs follow a Willans law, with a large initial expense and small increase with number of consumers.

The greater part of management expenses are, therefore, fixed charges allocated to running the undertaking and developing it. Development expenses should be allocated in proportion to the profit made on each class of supply, and the same applies as regards rates and taxes.

Capital charges must be allotted according to the M.D. on the plant, but a difficulty arises in ascertaining how the M.D. of any individual consumer or class of consumer affects the total. The author shows the division of working costs, capital, &c., in the way described in the case of Grimsby, and applies the figures obtained to various classes of consumer.

In the case of bulk supply or cooking (where cost of service, standing charges, rates and taxes, and management would not be increased), the net extra cost at Grimsby would be £2·115 per KW. of increase in the peak on the basis of new plant, or £3 18s. if the average cost of present plant were included, with an extra ·31d. to ·36d. per unit sold. Comparing the present flat rate of 3¾d. per unit in Grimsby and a R.V. system of 15 per cent. plus ½d. per unit, for houses assessed at £20, the latter rate brings in about £1 per annum more where lighting only is used; if such consumers adopt cooking, this is equivalent to paying £1 per annum and ½d. per unit for cooking.

Experience shows that the increase in the peak due to cooking (12½ per cent. connected demand) equals about ·3 KW. per consumer, the capital charges for which can be set against the £1 mentioned above.

Experience at Southampton shows that the effect of cooking on the peak is very small, and that it has resulted in improved load factors.

The Commercial Development of Electricity Supply.

AFTER reading carefully through the paper by Mr. Vignoles, of Grimsby, the first thought that came to the writer was that he had embodied enough material for considerably more papers than one; he has written on all phases of electricity supply where the term "business" can be applied even in an elastic manner, and he has discussed points and problems in a way that sometimes almost leaves business and borders on the purely engineering or technical.

The next thought that came to me was a sense of slight disappointment, engendered perhaps by this very diversity. I had rather hoped, after reading the first few pages, that Mr. Vignoles would keep on in the strain in which he began and go into further detail about the business-getting end of development. The art of getting new business and rendering every consumer a "satisfied customer," especially in the smaller undertakings, is not so thoroughly understood and appreciated that there would be any fear of the majority of Mr. Vignoles's audience being nauseated by a little more elaboration and description of his up-to-date methods and by more of his common-sense remarks on this important branch of commercial development.

It is presumed that the methods employed by Mr. Vignoles will apply in whole or in part to towns whose population is not so large as that of Grimsby, but which are equal in size electrically, unless of course such towns are electrically "saturated," and there are none such that I can think of at the moment.

It is not all of us who have been in the industry of electricity supply since the days when the one and only aim of the chief officer was to keep the supply going, and every problem that arose was a technical one, who so thoroughly realise, as does Mr. Vignoles, that all who are engaged in the supply of electricity have something to sell, just as the grocer or the draper, and it is refreshing to one who has constantly maintained that good engineering in a station without good business methods is of little worth, to find another engineer of the same mind who expresses the same sentiments so forcibly in this paper.

There are several points in the early part of this paper that can bear the light of further explanation; *e.g.*, after Mr. Vignoles has stated that Grimsby possesses no special powers, he makes the mouths of many of us water by describing his methods of getting customers—hiring-out of apparatus and the hire-purchase of installations being among the chief of these. Some of us who control the destinies of other undertakings of about the same size as Grimsby believe that these two things are almost vital to our prosperity, and yet, when such have been attempted, we have been peremptorily stopped by injunctions or other legal instruments, either through our competitors or through those who should be on our side.

Mr. Vignoles is in a very much better position at Grimsby than are a great many engineers; he seems to be able to do a great many things to promote business that other engineers would give a great deal to be able to do. In most towns that have no special powers, and particularly in the smaller towns where everyone seems to know every other person's business, engineers are rigidly kept from doing anything which is *ultra vires* of their powers, and these powers are simply their Provisional Order and the various Electric Lighting Acts; under these powers the poor engineer is bound down to the supply of electricity and the supply of electricity only. Any attempt on his part to do anything of the kind that Mr. Vignoles does at Grimsby with apparent impunity, or to do anything to obtain new business that is outside the

strait and narrow way that is rigidly laid down for him, generally results in official complaints to the Council, in which our friends the enemy are usually well represented, threatening all sorts of pains and penalties.

I will now leave this part of the paper with the earnest hope that the matter so ably put together by Mr. Vignoles will stir up his hearers to a fuller realisation of the fact, for fact it is, that the obtaining of fuller powers for doing business is an absolute necessity, and that these powers are wanted at once. There surely must be a *via media* along which all parties might proceed together, particularly if all will remember that half a loaf is better than no bread. It will be a memorable achievement for the Convention of 1914 if this paper, and the discussion thereon, shall stir up such a wave of feeling among the unfortunate engineers who want to go ahead, and are so terribly handicapped, that they resolve to have done with so much talking and get on to real action, and not to rest until these powers are obtained.

Now that the Electric Vehicle Committee has paved the way for the work of other specialised Committees, I earnestly commend to the I.M.E.A. the suggestion of Mr. Vignoles that a special Publicity Committee be formed, and that its scope be on much the same lines as the admirably conducted British Commercial Gas Association.

Whatever be our opinion as to the merits of the commodity they sell, no one will deny after seeing the *Daily Mail*, *Punch*, or many other papers that it is at least well sold.

After leaving the actual business-getting of an electricity supply concern, Mr. Vignoles gives some good advice, which many Committees might read with advantage, as to the desirability of not being too conservative over mains extensions. There are, I think, few engineers who have not suffered, as did Mr. Vignoles, the indignity of having to lay mains past premises using a gas supply which had previously asked for a supply of electricity.

On the question of the half-watt lamp in small sizes, Mr. Vignoles forgets his early remarks. Surely, if we remember, it is light, heat, or power that the consumer buys, and not electricity; then it only means a suitable tariff for the undertaking to get its proper return from even small consumers. All of us are, I hope, looking for the time when electricity *per se* will not only be the cheapest means of artificial lighting, but also lamp renewals will be comparable with the cost of gas mantles. It is undoubtedly, in spite of isolated cases of successful application, the initial cost of lamps that prevents the late Sir William Preece's prophecy that electricity would become the poor man's light from being almost immediately realised.

The small consumer is, in my opinion, in most cases better tackled by a fixed weekly charge, either with or without a current limiter, than by means of slot-meters. My reasons for not agreeing with the author are that low-priced slot-meters cost a lot for upkeep, and the reliable ones are expensive; thus in any case the revenue from the consumer is "well watered" with meter charges.

Mr. Vignoles's remarks on charges are generally sound, but I wish, in view of the aim we are all working for, of universal electrification, that he had made a greater point of the mistake of charging low prices, such as 3¾d. or 4d. per unit, for such short-hour lighting supplies as the average office and the windows of high-class shops; to me it seems less defensible and a worse policy than charging what is considered by some people too low a rate for a cooking load.

With regard to charges in general, the local conditions have a great deal of influence; for example, a shop lighting load in East Ham is a much more profitable one than in, say, Cheltenham, and low charges for a power supply have no value in a town such as Eastbourne, while they are vital in a place like Maidstone. In framing a schedule of charges more attention should, I think, be devoted to the idea of a good load factor than to the actual obtaining of any class of customer whether profitable or not.

The pages on the financial side of the working of electricity undertakings evince a large amount of deep thought, and much that is written is of great value and should be brought home to all members of Committees; it is, however, outside the scope of this short article to say much on these points.

It is, as Mr. Vignoles has remarked, both interesting and instructive to work out the average cost per unit for each class of supply and compare it with the average price obtained for each class.

This can easily be done after the maximum demand on the station of each class of supply has been obtained, as the number of units sold for each class of supply is, of course, known. I have done this for a station having an output slightly smaller than Grimsby, where the total supply can be divided up as follows:—Shop and office lighting, private house lighting and the lighting of licensed premises, power supply, traction supply, street lighting supply and sewage pumping supply. Some of these demands can be accurately measured, and by taking the load curves of several days, such as Sunday, Wednesday, Saturday, as well as an ordinary week-day, and making equations with one or more unknowns, the demand of each class of supply can be got fairly accurately.

With the units sold known, it is then an easy matter to work it out on the same basis that Mr. Vignoles recommends, and which is the only method that is quite sound.

In conclusion, this paper is certain to bring forth a good discussion, and by stimulating interest in some of the most pressing needs of the smaller and pushing undertakings should do the industry, as a whole, a great deal of good.—E.E.H.

(*To be continued.*)

CORRESPONDENCE.

Letters received by us after 5 P.M. ON TUESDAY *cannot appear until the following week. Correspondents should forward their communications at the earliest possible moment. No letter can be published unless we have the writer's name and address in our possession.*

Review of "Electrical Meters."

Referring to the letter from Mr. G. C. Allingham which appeared in your issue of the 5th inst. in connection with the above subject, it may interest your readers to know that about 30 years ago the writer saw a small electrical "make and break" vibrator screwed on to the "cradle" which carried the fibre thread to which the fine glass tube, conveying ink from an ink well to the paper slip of a Thomson siphon recorder, was attached. Previously the ink had been spurted on to the paper by an electrical discharge provided by an "influence" machine, the circuit of which was completed through the ink in the glass siphon to the paper across the small space which separated the point of the siphon from the paper. This arrangement provided a frictionless conveyance of the ink to the paper, and was generally satisfactory, but gave trouble sometimes, especially in damp weather. By means of the vibrator, or "electric trembler," particles of ink were shaken out of the siphon on to the paper at a high rate of speed, the appearance at the point of the siphon being a fan-shaped blur. The glass siphon was kept always full by capillary attraction, after being once filled by suction.

This occurred at the Eastern Telegraph Co.'s Lands End Station, Porthcurno, and was found to provide a most satisfactory frictionless contact; it was afterwards universally adopted for all siphon-recording instruments, and, as far as the writer knows, is still in general use.

An arrangement of this kind is certainly needed for all delicate recording instruments, if accuracy is to be obtained.

Norman J. Hockley.

Manchester, *June 9th*, 1914.

Is Aluminium Diamagnetic?

In reply to your request on page 915 for information as to the magnetic properties of aluminium, may I refer you to Horda's paper in Science Reports of the University of Sendai, 1912, or to a shorter paper in the "Annalen der Physik," XXXII, page 1045 (1910). Aluminium appears to be paramagnetic, with a specific susceptibility of about $\cdot 6 \times 10^{-6}$.

Charles H. Lees.

Woodford Green, *June 5th*, 1914.

Comparative Economics of Tramways and Railless Electric Traction.

Mr. Gribble appears to abandon the claim made in his paper that the railless car of 28 to 36 seating capacity has equivalent earning power to the average tramcar, and by that admission the basis of his comparison fails, and the whole structure falls. It is not my intention to begin a discussion on the basis of a 56-seated car, which has not yet been ordered or built to comply with the weight limits and other regulations in force in this country, and which, therefore, is a purely hypothetical entity.

On the York case, my answer was intended to be complete, and still seems so. Trying again, it is that the trackless car of Mr. Gribble's paper run on the same services and fares, could only have earned about two-thirds of the revenue per car-mile actually earned by the tramcars; whilst trackless cars of equal seating capacity in all weathers would have earned as much as the tramcars per car-mile, but the total working expenses and capital charges would have been decidedly higher. The York tramway department now finds it necessary to procure trailers, showing what experience has taught it as to the need of high seating capacity per service unit.

Mr. Wakelam stated that petrol motor-'buses on Middlesex roads added 2d. per 'bus-mile; and Mr. Carpenter stated that the Rotherham railless cars, on the Rotherham route (West Riding roads), added 4d. per 'bus-mile to the cost of road maintenance. Evidence of facts within their official knowledge, which it was their official duty to observe and record, from professional men of high repute in responsible positions, and without personal interest in exaggeration, carries great weight, and can neither be discredited nor disproved. It is in an entirely different category to "expert evidence" of opinion and estimate. The facts are disagreeable, but they have to be faced.

It is not necessary to discuss Mr. Gribble's views on fares. The trend of experience is against him, and in his paper he tacitly assumed tramway conditions. It may, however, assist him to peruse the Glasgow tramway reports, for example, for the last few years, as the subject of fares and stage lengths has been studied experimentally and the results recorded with much care and acumen by Mr. Dalrymple. It is hardly accurate to say, as Mr. Gribble does, perhaps inadvertently, that tramway fares have been lowered by the compulsion of competition. The complaint of competing transport undertakers is just the reverse, viz., that tramway competition compels them to fix unremunerative fares.

The Critic.

A Motor Problem.

Will any reader kindly inform me the best method, H.P., and type of motor, for a 220-volt D.C. circuit, required to replace a 45-I.H.P. steam engine driving the stamp shop of an engineering smithy? The load is fluctuating, with at times a heavy overload that slows the engine down almost to a standstill, and causes the main belt to slip, but it quickly recovers normal speed when the load is released. There are seven stamps, varying from 3 to 6 cwt., with belts over a 3 ft. 6 in. diameter lifting pulley running at 150 R.P.M., also various other smithy tools.

Any practical information on this subject will be greatly appreciated.

Inquirer.

"A Tester" has not enclosed with his letter his name and address.

A Canadian Innovation.—We drew attention in a recent issue to the mining regulations which it was proposed to enforce for all electrical work in Montreal. Matters are now being carried a step further, and efforts are being made on behalf of the workers to ensure that only those men possessing a certificate of efficiency, countersigned by the city officials, shall be eligible for employment as electrical wiremen in the city. The principle has much to recommend it at first sight, but the possible abuses of such a plan of action forbid our proposing it for general adoption. Should it be introduced in Montreal and the example followed in other parts of Canada, it will place a real difficulty in the way of emigrant wiremen getting their first job in Canada.

LEGAL.

OSRAM LAMP WORKS, LTD., *v.* THE BRITISH UNION LAMP WORKS, LTD.

ON Friday, June 12th, the defendants in this action moved before Mr. Justice Sargant in the Chancery division to discharge an order made in Chambers requiring them to make certain experiments in the presence of the plaintiffs' expert witnesses.

MR. FROST, who moved, said that the plaintiffs were suing for alleged infringement on two patents, one of 1904, and the other No. 3,622 of 1906, in both of which the presence of carbon in the filament was an element. The defendants denied that in their filament there was any carbon, and they had been required by order of the Court to carry out their process of manufacture in the presence of the plaintiffs' experts.

His LORDSHIP asked whether the objection was to the order as a whole, or to any particular part of it.

MR. FROST said that, in the first place, the defendants' submission was that the plaintiffs had not made out a *primâ facie* case for the order at all; and in the second, they were not now making the lamps complained of, and it was impossible now for them to get the material from which their filaments had been made. The first defence to the action was the invalidity of the patents sued upon. The statement of claim was in the usual form, alleging that the two patents had been infringed, and in the particulars the manufacture and sale of certain lamps in this country was specified. The defence admitted that in or about the month of April certain lamps were made in this country in accordance with a Berlin patent No. 7,092 of 1909 granted to Henrich Weber, from a compound supplied to the defendants by Henrich Weber from Berlin, and that those lamps were sold. The plaintiffs then wanted to know how those lamps were made. The defendants admitted that the filaments were manufactured from tungsten, but denied that there was any carbon in the compound. The lamps were then examined by Dr. Oberlander, who said he was satisfied that an organic fibre must have been used in the manufacture, and that the compound must have contained carbon. Now the plaintiffs, by their director, Mr. Peace, had sworn on three separate occasions that the lamps were manufactured in accordance with the German patent, and by that method no organic fibre was used. All that Dr. Oberlander had said in answer was that he knew of no other method except the plaintiffs' by which they could have been made. This affidavit, counsel submitted, was nothing more than a submission to the Court that these lamps were made in infringement of the plaintiffs' patent.

MR. JUSTICE SARGANT said it was pretty obvious what the plaintiffs' case was. They say you have used an organic fibre or medium.

MR. FROST: And I have positive evidence to the contrary.

His LORDSHIP: Then they say your process could not have produced these lamps. You must have had some carbon, because this gentleman of great experience says your lamps could not have been produced without it. Is not the best way to test that to conduct the experiments as directed by the order?

MR. HUNTER GRAY said Dr. Oberlander went further than that. He said there must have been organic fibre used.

MR. FROST: And we say positively no.

His LORDSHIP: We have a positive statement by the defendant that a thing was made in a certain way. Am I to take that as binding on the plaintiffs, and say that I won't have any experiments made to test it?

MR. FROST would not suggest that, but he did submit that the Court would require something stronger than the mere suggestion of Dr. Oberlander.

His LORDSHIP: If this defence is correct, is not the most perfectly satisfactory method of disposing of the action to carry on the manufacture in the presence of the plaintiffs?

MR. FROST said that the difficulty was that the defendants did not now manufacture in this country. All their apparatus had been disconnected.

His LORDSHIP said he understood that the plaintiffs were perfectly willing to put at defendants' disposal their manufactory and all their apparatus.

MR. FROST said that was true so far as the apparatus was concerned, but they had to start by getting this material. The defendants had quarrelled with Henrich Weber and were unable to obtain a further supply from Berlin.

His LORDSHIP said it was quite clear that they could not be ordered to carry out a process with material that they could not get.

MR. HUNTER GRAY: We will get the material for them.

MR. FROST suggested that that would not do. It would give rise to the question whether the material was the same.

His LORDSHIP asked whether the stuff was squirted.

MR. FROST said no. The squirting process was dying out altogether. His submission was that there was an infringement that had long ago ceased, and it was not right that the defendants should be asked to make these experiments. The position would be quite different if this were a going concern.

His LORDSHIP: It really is the difficulty of carrying out the experiments.

MR. FROST said that was so. The real position was, the defendant company had a right to manufacture in this country under Weber's patent 7,092 of 1909. They always used that process for the manufacture of a tungsten filament with a binding medium described in the patent, but which the defendants always got from the patentee. They could not now get that binding medium. It was a combination of sulphur and phosphorus, and contained no carbon.

Mr. Hunter Gray pointed out that the medium was well known and could easily be obtained. The defendants could buy the medium, or, if not, they could get the ingredients in any shop.

Mr. Justice Sargant: Then so can you, Mr. Gray.—And I will.

His Lordship did not see why the plaintiffs should not make the medium, and then the defendants could carry out the process.

Mr. Frost said the difficulty would be then in showing that it was the same as that which the defendants obtained from Berlin.

Mr. Gray: They say it was a binding medium made in accordance with the specification, and we will supply them with a binding material made in accordance with the specification.

His Lordship asked why the plaintiffs could not get some from Berlin.

Mr. Gray said that of course they would do so if they could; if not, they would make it in accordance with the specification. Their case was that the defendants must have used an organic binding medium.

His Lordship: That is to say that really the material supplied from Berlin was not material made in accordance with the patent.

Mr. Gray: Or that, consciously or unconsciously, something was introduced in the process of manufacture.

His Lordship said the point seemed to him to be whether he could order the defendants to do something entirely different from their ordinary process of manufacture. He could not order them to make experiments with something they could not get.

Mr. Gray: If they can't we will supply them.

His Lordship said he did not see how the defendants could object, but, of course, it would be left open to them to say that the material supplied by the plaintiff was not the same as the material supplied by Weber.

Mr. Frost suggested that that would not do. To make this material would naturally require a certain amount of skill and practice, and for the defendants or the plaintiffs to make it might result in the production of a different kind of material.

His Lordship said if Weber supplied the stuff still he could not see how the defendants could object to the order, and if it could not be got from him, then they must get the best they could. It would not be so satisfactory to the plaintiffs, but it would be the best thing that could be obtained.

Mr. Frost suggested that the order should go until the plaintiffs had established the validity of their patent.

His Lordship said he could not try the action piecemeal.

Mr. Frost submitted that the defendants used a particular material which they obtained for a particular period. They could not get it now, and the Court would not order them to carry out something they never did carry out, and which might be quite different to anything they had ever done.

His Lordship thought the order must stand, but as the defendants might not be able to get the original medium, it must be varied by adding a direction that it must not be construed as obliging the defendants to carry out the process with a medium obtained from Henrich Weber so far as they were unable to procure such medium, and in the event of their being unable to secure such medium, the process to be carried out with a medium to be prepared by the plaintiffs in accordance with the first part of Weber's specification, or at the option of the defendants by some independent person to be agreed upon between the parties. The costs of the motion were made costs in the action, and leave was given to the defendants to appeal.

British Thomson-Houston Co., Ltd., *v.* The United Electric Supply Corporation.

This action brought to restrain an alleged infringement came before Mr. Justice Sargant in the Chancery Division on Tuesday, June 16th, on a motion for judgment in default of appearance by the defendants.

Counsel for the plaintiffs, stated that the alleged infringement was in respect of letters patent for the manufacture of electric light filaments. They had been unable to serve the defendants with notice of the proceedings in the usual way, and an order for substituted service was obtained. Under that order all the necessary steps had been duly carried out, and all the necessary papers properly filed. The defendants did not now appear, and the plaintiffs asked for an order in the terms of minutes which had been drawn in the usual form of orders in patent actions.

His Lordship made the order as asked.

Parker *v.* Hemming.

In the King's Bench Division on Friday, June 12th, Mr. Thomas Hugh Parker, engineer and a member of the Institution of Electrical Engineers, who resides at Richmond, East Sheen, was awarded £200 damages against Mr. Henry Joseph Randolph Hemming, a retired solicitor and promoter of a company called "Hemming's Process, Ltd.," for false imprisonment and malicious prosecution. Mr. Parker let a part of his premises at Sheen to the company, agreeing to give a part of his time to adjusting the company's machinery. He was cleaning a lathe and drilling machine in his private room in January last, when Mr. Hemming called him a thief and gave him in charge for stealing the lathe and drilling machine. The magistrates dismissed the summons and ordered Mr. Hemming to pay the costs, stating that he had not brought the prosecution in good faith.

The jury found there was no ground for the allegation of theft, and that the defendant was actuated by malice, and judgment was entered for the plaintiff with costs.

Underground Electric Railway.—Stamp Duty Assessment Appeal.

Mr. Justice Scrutton, in the King's Bench Division on Monday, gave judgment in a Revenue Appeal by the Underground Electric Railways Co. of London, Ltd., and Messrs. Glyn, Mills, Currie & Co., *v.* The Commissioners of Inland Revenue. The point upon which plaintiffs appealed was raised under the Stamp Act, 1891.

Mr. Roskill, K.C., and Mr. Austen Cartmell were for the appellant companies; and the Attorney-General (Sir John Simon, K.C.), and Mr. Finlay were for the Commissioners.

The appeal arose out of the proposal to amalgamate in the matter of control, the Central London Railway Co. with the other group of Tubes controlled by the Underground Electric Railways Co. of London.

His Lordship, in delivering his reserved judgment upon arguments heard a week previously, said that the question for the Court to determine, was the stamp duty payable on an indenture dated December 13th, 1912, and made between the railway company and the bankers (as trustees). The Central London Railway Co. had issued £3,000,000 worth of ordinary stocks. The Underground were desirous of obtaining control, and were willing, if a sufficient number of the holders of stock in the Central London Railway would take guaranteed stock in exchange, to give 4 per cent. if the profits of the railway were not enough to pay that rate of interest. Applications from such stockholders were not to be received until December 31st, 1912, and at the date of the indenture it was not known if sufficient holders would exchange to enable the transaction to go through. Nor was it known what excess over profits it would be necessary to pay on the guarantee stock. It was known that the company might become liable to pay £120,000, that being 4 per cent. on the £3,000,000. Under these circumstances, the Commissioners assessed the instrument to a 10s. stamp duty (which was not objected to), and to a duty of £3,000, which was assessed by reference to the heading in Schedule 1 of the Stamp Act of 1891. It was against the latter assessment that the appeal was taken, and it was contended, said his Lordship, that the document did not come within the schedule, because at the time of the making of the instrument there was no fixed sum payable. This, if correct, would free them from £3,000 stamp duty altogether, and alternatively the appellants contended that, in any event, duty should be assessed not on the annual possible liability of £120,000, but on the possible liability of £60,000 for the half-year, which would reduce the duty by £1,500.

His Lordship found that both these points taken by the appellants failed, and he dismissed the appeal, with costs.

Mr. Roskill asked, in view of the importance of the point, for a stay, his object being to avoid taxation before an appeal.

Mr. Finlay (for the Commissioners) said he had no doubt the matter could be arranged.

Electric Lighting of Brixham.

Application was made to Mr. Justice Neville in the Chancery Division on Tuesday, June 16th, for a further suspension of the injunction granted in the action of Edwards *v.* the Brixham Gas Co. in December last, restraining the defendants from so working their electric light plant as to cause nuisance or annoyance to the plaintiff or damage to his property adjoining the defendants' works.

The injunction was originally suspended for three months to enable the defendants to so reorganise their plant as to abate the nuisance, and on an application to Mr. Justice Astbury in March last, that suspension was continued for a further three months.

Mr. Palmer, representing the defendants, said that notice of motion had been served upon the plaintiff, asking for a further suspension, but the evidence was not complete, and he had to ask that that motion should not be heard for a fortnight. In the meantime, however, the suspension granted by Mr. Justice Astbury would expire.

Mr. Peterson, K.C., for the plaintiff, said that he opposed any further suspension, but if the defendants desired time to complete their evidence he did not object to a fortnight's adjournment.

Mr. Palmer said his reason for applying now was that the suspension would come to an end before the motion could be heard.

Mr. Peterson said he would not oppose a suspension for a fortnight upon the same terms as before.

Mr. Palmer said that was all he desired, and accordingly his Lordship adjourned the motion for a further suspension for a fortnight, the original suspension of the injunction to be continued for that period upon the same terms as heretofore.

Venner's Signs, Ltd., *v.* Stellar Signs, Ltd.

This case was again mentioned to Mr. Justice Astbury in the Chancery Division on Friday, on a motion by the plaintiffs for an injunction to restrain alleged infringement.

Mr. F. Russell, K.C., for the plaintiffs, said the evidence was now completed, and there was a serious conflict as to the facts, and as to the alleged infringement of patent. He, therefore, proposed to take no order on the motion except that, as Mr. Kerby, for the defendants, desired, the costs of the motion would be reserved to be dealt with at the trial.

The motion, therefore, stood over until the trial of the action.

Workmen's Compensation.

Whilst in the employ of Mr. J. H. Rankin, electrician, of Weymouth, an employé named Holmes lost the sight of one eye through the bursting of an electric light globe. The sum of £100 had been paid into Court under the Workmen's Compensation Act.

Mr. Wilton Reed, on behalf of the grandmother of the boy, applied at the Weymouth County Court that the sum of £10 should be paid forthwith for the purchase of clothing, the lad having obtained a position as electrician's improver at Dorchester. The lad had lately been getting 6s. a week.

The Judge considered £100 a small amount.

Holmes stated that he was now earning 19s. a week.

The Judge made an order for £10, and said that the balance would remain in Court until the lad attained 21 years of age, when a fresh application could be made. It was very unfortunate that only £100 had been obtained.—*Bournemouth Echo.*

At Accrington County Court, on June 11th, Judge Sturges approved a settlement of £125 in commutation of the claim of James John Linsley, electrical wireman, Accrington, who whilst in the employ of Mr. Arthur M. Cramp, electrical engineer, of Haslingden, met with an injury, from which complete loss of one eye resulted.

Evans *v.* Premier Electric and Hardware Co.

Last week Mr. Justice Astbury, on the motion of the plaintiff in a debenture-holder's action, appointed a Receiver and manager of the defendant company's business.

Counsel for the company consented to the appointment, and also to the usual judgment in the action, and his Lordship made an order accordingly.

BUSINESS NOTES.

Private Arrangement.—Premier Electric and Hardware Co., Ltd., 9-10, Cheapside, Golder's Green, London.—In response to a circular letter issued by Mr. James Mortimer, accountant and auditor, of 3, Pancras Lane, Cheapside, E.C., a largely attended meeting of the creditors of the above was held on June 10th. A statement of affairs was presented which showed unsecured liabilities of £967. The assets were estimated to realise £923, from which had to be deducted £175 for preferential claims, and £251 due on debentures. The net assets thus amounted to £496, and as regarded the creditors a deficiency was shown of £474. Mr. Mortimer stated that the present meeting had been called as creditors were pressing, and the debenture-holder was taking steps to appoint a Receiver. He suggested that the business might be continued under the supervision of a Receiver appointed by the creditors, with a view to the debentures being paid off within three or six months. That would be better from the point of view of the creditors than a sale of the assets. The unsecured creditors could be secured by the issue of a second debenture. He also suggested that the creditors should accept a composition of 7s. 6d. in the £, but as it was necessary for the company to first provide for the debenture the composition could not be paid at once. The 7s. 6d. in the £ could be paid by three instalments at 9, 15 and 21 months. There was a debenture in existence for £250, which was issued for cash in April of the present year. The money received from the debenture was paid away to creditors. Mr. Mortimer said that the creditors should remember that at a forced sale, after paying all charges, they could not hope to receive much by way of a dividend. The company occupied a good position in Golder's Green, and could trade successfully in the future. In the past it had been hampered by lack of capital, and considerable legal expenses had been incurred. During the 14 months to February 28th last, there was a net profit, after paying all expenses and the directors' fees, of £188. The company was formed in March, 1913, with a nominal capital of £2,000 in £1 shares. The company took over a business which had previously been carried on by Mr. George Cohen at the above address. The assets taken over were valued at £1,500, and they were paid for by the allotment to the vendor of fully paid-up shares. Mr. Geo. Cohen was appointed managing director of the company for life, at a salary of £200 per annum, and as general manager he was to receive a further £300 in discharge of all claims for travelling and incidental expenses. The debenture was issued on April 29th. Mr. Tubbs, solicitor, expressed the opinion that the debenture was not valid, as its issue was only authorised by one director, whereas the articles of association provided that two directors should form a quorum. After some discussion a resolution was passed instructing Mr. E. H. Hawkins, of Messrs. Poppleton, Appleby & Hawkins, chartered accountant, 4, Charterhouse Square, E.C., to prepare a report in order that counsel's opinion might be taken as to the validity of the debenture. A committee of five of the principal creditors was also appointed to consider what steps should be taken when counsel's opinion had been received.

Australia.—His Majesty's Trade Commissioner at Melbourne announces that on and after 11th inst. his address will be Commerce House, Flinders Street. An inquiry and reading room will be available in connection with the new offices, where information in regard to British trade may be obtained, and British trade journals and catalogues consulted.

London & North-Western Switchgear Contract.—We learn that the British Westinghouse Electric and Manufacturing Co., Ltd., have secured the contract for the extra-high-tension switch-gear, and also the low-tension switchgear and connections for 11 sub-stations, in connection with the London & North-Western Railway Co.'s North London electrification. The switchboard panels on order at the present time total 258, comprising 129 high-tension panels and cubicles, 107 direct-current sub-station panels and 22 low-tension A.C. and D.C. boards in the main station. The sub-stations in question are situated at Camden, Queen's Park, Stonebridge Park, Kenton, Pinney, Bushey, Dalston, Broad Street, Willesden, West End Lane and Acton. There are three rotary converters in each sub-station, excepting at Broad Street and Acton, in which there are two; of these rotaries six situated in Camden and Bushey sub-stations are of 1,000-kw. capacity, and the rest of the rotaries have each a capacity of 750-kw. The number of high-tension feeders coming into the sub-stations total 30, and there are also 18 H.T. outgoing feeders. The oil break circuit breakers are of British Westinghouse design and manufacture, and are to be of the remote mechanically-operated type, excepting in the case of Stonebridge Park sub-station, where the switches will be of the solenoid electrically-operated type. The switches are of the latest design, and are arranged in such a manner that phase separation can be carried out throughout the whole of the switchboard structure, each separate phase of the switch being contained in a separate tank, and in a moulded stone cubicle entirely separated from the other phases. The bus-bars are sectionalised in each sub-station, and each machine can be connected through isolating switches to either of two main bus-bar sections. Isolating switches are being provided on each side of the main oil switches. All incoming feeders will be fitted with reverse current relays for tripping the oil circuit-breakers, and all outgoing feeders and transformer circuits will have overload relays with time limit attachments. The rotary converter E.H.T. circuits will also be fitted with overload time limit relays. Each section of bus-bar will be fitted with Horn type static dischargers combined with the usual resistances and isolating switches. The panels on which are mounted the instruments and handles for operating the oil circuit breaker are situated on the floor level, and behind them are the cubicles containing the oil switches. These are linked to the operating handles which are mounted on the switchboard by means of levers and rods. In the case of the Stonebridge Park sub-station, the operating panels will also be on the floor level, and the switches will be electrically operated. The cell work is to consist of moulded stone. The slate panels of which the H.T. control board and also the L.T. switchboards are made will not be enamelled, but will be finished with a black marine finish. The low-tension panels, exclusive of battery and booster panels, which form the subject of another contract, deal with 100 out-going feeders and 31 rotary converters on the D.C. side. The rotary converter circuits are fitted with reverse current single-pole circuit-breakers, fitted with a tripping arrangement for operation by speed limiting devices on the rotaries. The track feeder panels which control both poles of one feeder are fitted with single-pole overload circuit-breakers for 2,000-ampere and two single-pole knife switches for the same current. Sector pattern moving-coil ammeters are used, and have illuminated dials. The circuit-breakers are of the well-known Westinghouse type "C" traction pattern, which are in use on so many other traction systems throughout the country and abroad. In addition to the above panels, there are lighting and auxiliary panels in all the sub-stations, and in the power station a low-tension alternating current and low-tension direct-current board are also to be supplied under this contract for dealing with the circuits feeding the auxiliary machinery, lighting, &c. The value of the contract is estimated at between £50,000 and £60,000.

Annual Outings.—The works of the Walsall Electrical Co., Ltd., will be entirely closed to-morrow (Saturday), when the annual outing takes place at Blackpool. Employés are receiving from the company a free ticket and a bonus valuing £1 1s. downwards, according to length of service.

The fire brigade attached to the head office of the General Electric Co., Ltd, spent a very enjoyable time at Southend-on-Sea on June 5th, on the occasion of their annual outing. The party included the captain of the brigade, Mr. W. H. Snowden, and Instructor Riley. Dinner was served at the Grand Pier Hotel.

The annual excursion of the employés of Messrs. E. Brook, Ltd., of Huddersfield, took place on Saturday, June 13th, the party going in char-à-bancs to Morecambe *viâ* Skipton, Settle and Lancaster, returning *viâ* Preston, Bolton and Manchester. A very enjoyable day was spent in exceptionally fine weather. The arrangements were carried through by Mr. Frank Rothwell, who acted as secretary.

Turbine Manufacture in Norway.—At the Myrens Mechanical Workshop in Christiania, the finishing touches are being applied to a new turbine for the company which is harnessing the Vamma water-course. It is a Francis turbine, and will be used with a head of 26 metres; it will run at 214 R.P.M., and generate 12,000 E.H.P. The water will be conducted through a pipe of 4½ metres diameter, and the supply of water is estimated at 45 cubic metres per second. The over all diameter of the turbine is 5½ metres. This is the largest, although not the most powerful, turbine that has ever been delivered from a Norwegian workshop. The same firm has now 45 turbines of various sizes under construction, and it has also exhibited at the Christiania Exhibition a turbine of 16,400 H.P., which is going to be delivered to Rjukan II, to work under a head of 250 metres.

Catalogues and Lists.—THE BROMPTON AND KENSINGTON ACCESSORIES CO., LTD., 254-260, Earl's Court Road, S.W.—Collection of illustrated price lists in expanding cover describing their model "C" electric cooking stove, with temperature curves and diagrams of connections; also the combination electric cooking range, model "E," hot cupboards and carving tables, and electric grills and toasters.

MESSRS. SIMPLEX CONDUITS, LTD., 116, Charing Cross Road, London, W.C.—An interesting pamphlet of 40 pages, written by Mr. T. Birkett, late of the firm of Jesson & Birkett (now incorporated with Simplex Conduits). It is entitled "Notes on Period Designs in Electric Light Fittings," and is a reprint of a series of articles from a contemporary, followed by illustrations and prices of some "period" designs of Simplex fittings.

THE BRITISH THOMSON-HOUSTON CO., LTD., Rugby.—Price list No. 7,660 describes and gives prices of the "Calorite" electric stove for rapid boiling of water.

MR. G. BISHOP, Mary Ann Street, Birmingham.—Leaflet giving prices of electric fans.

THE SUN ELECTRICAL CO., LTD., 118-120, Charing Cross Road, London, W.C.—Illustrated priced leaflet giving particulars of c.i. junction boxes (approved by L.C.C.) and improved spacing saddles for damp situations and clips for conduit.

THE STERLING TELEPHONE AND ELECTRIC CO., LTD., 210-12, Tottenham Court Road, London, W.—8-page pamphlet (No. 228) containing a full description, with a number of illustrations, of their new type of moving vane variable air condenser (Dr. Seibt's process) for electric oscillations.

THE BRITISH THOMSON-HOUSTON CO., LTD., 77, Upper Thames Street, London, E.C.—Illustrated and priced folder (No. 10,300) relating to their glass reflectors for direct lighting—Veluria, Holophane, Opalux and Sudan—a circular for contractors to distribute.

THE WAVERLEY CO., Indianapolis, U.S.A.—Attractively illustrated 8-sheet publication showing and describing their Silent Waverley electric broughams.

PHŒNIX-LICHT-GESELLSCHAFT M.B.H., Babelsbergerstrasse, 40, Berlin-Wilmersdorf.—Leaflet describing the "magnetic mirror," a new shop-window advertising device.

THE FRANCO-BRITISH ELECTRICAL CO., LTD., 50, Oxford Street, London, W.—Twenty-four-page catalogue giving prices and showing specimens of a variety of electric box signs, window reflector signs, electric letter signs, hanging signs, sign flashers, illumination strip, time switches, sign lamps and holders.

Trade Announcements.—MESSRS. MORRIS & LISTER, LTD., of 3 and 4, Palace Chambers, Bridge Street, Westminster, S.W., and Carlton Works, Lockhurst Lane, Coventry, who have hitherto been representing Messrs. Nalder Bros. & Thompson, Ltd., to a limited extent for the sale of their manufactures, have now been appointed the firm's representatives in the London and country districts heretofore worked by Messrs. Frampton & Paine, whose agreement for the agency has expired.

New business premises at Gillygate, Pontefract, have been opened by MESSRS. PARKER & JUBB, electrical engineers.

MR. NORMAN TEGETMEIER has lately been appointed sole London agent for Messrs. Pitter's Ventilating and Engineering Co., Ltd., and on the 24th inst. he will be opening showrooms at 70, Great Portland Street, W., where he will trade as the Norman Electrical Agencies and display electric light fittings made by Messrs. Peyton & Peyton, Ltd., whose sole agency he holds. He will also carry a stock of Messrs. Pitter's multiblade fans for all voltages.

The name of The Private Telephone Co., Ltd., has been altered to THE PRIVATE TELEPHONE AND ELECTRIC CO., LTD., and the address changed from 9-11, Cursitor Street, to larger premises at 28, Great Queen Street, Kingsway, W.C., where, in addition to offices and stores, there is a showroom for exhibition and demonstration purposes.

Liquidations. — RANKINE PATENT FEED-WATER FILTER CO., LTD. — This company is winding up voluntarily, with Mr. T. B. Maccabe, 30, North John Street, Liverpool, as liquidator. A meeting of creditors is called for June 22nd. Creditors, &c., should send the usual particulars by June 27th.

THE ANGLO-NORWEGIAN ALUMINIUM CO., LTD.—A meeting will be held at 28, Victoria Street, S.W., on July 17th to hear an account of the winding-up from the liquidator, Mr. F. C. Potter.

THE DURHAM COLLIERIES ELECTRIC POWER CO., LTD.—A meeting will be held at the offices of Messrs. G. A. Touche & Co., Basildon House, Moorgate Street, E.C., on July 17th, to hear an account of the winding-up from the liquidator, Mr. A. W. Tait.

HYDRO-ELECTRICAL GEAR CO., LTD. — A meeting is called for July 14th, at 11, Pancras Lane, E.C., to hear an account of the winding up from the liquidator, Mr. J. A. Henderson.

Bankruptcy Proceedings.—T. M. WOODCOCK, electrical engineer, Sheffield.—Last day for receiving proofs for dividend, July 3rd. Trustee, Mr. J. C. Clegg, 14, Figtree Lane, Sheffield.

Annual Conference.—The branch and departmental managers of SIMPLEX CONDUITS, LTD., have just held their annual Conference at Southport, under the presidency of Mr. L. M. Waterhouse, the managing director of the company. We understand that these conferences are of great value, enabling the company to deduce conclusions from individual experiences, and so form a straightforward policy ensuring good relationship between itself and its customers.

Book Notices.—"Canada: The Western Cities, their Borrowings and their Assets." By Henry Howard. London: *Investors' Guardian* Office. 2s. net.—The author, who is a financial observer of wide experience, has visited Canada on two occasions, in 1910 and 1913, traversing the Dominion from the Atlantic to the Pacific, collecting information respecting the financial position of many places, comparing their capital outlays and indebtedness with the results produced thereby. In the present book there is a series of chapters or letters dealing separately with each of the following Western cities:—Winnipeg, Prince Albert, Edmonton, Calgary, Victoria, Vancouver, Medicine Hat, Moose Jaw, Regina, Saskatoon, Brandon, Port Arthur and Fort William. The concluding chapter consists of an interesting and brief summary of general impressions. The author expresses the opinion that the ability of the Western cities, which have sprung up out of the prairie, to meet their financial obligations, and their prosperity generally, will depend upon the extent to which agricultural land and operations are developed. His general conclusion is that the British capital invested in the securities of the Western municipalities has a good and sure basis in the valuable assets owned by these cities, that interest on debentures will be promptly forthcoming, and that at its due date, the capital will be repaid. The book is an informing one for anybody interested in Canadian affairs and their future.

Holidays.—Holiday-makers whose thoughts are toward the Continent, will be charmed with a little brochure of some 70 pages, entitled "To the Continent." The pictures are executed in colour, and they convey an impression that the journey may be made one of comfort and attractiveness by G.E.R.. Harwich route. A postcard to the Continental Manager, G.E.R., Liverpool Street Station, E.C., will bring a copy along.

For Sale.—Huddersfield Corporation has for disposal a Ferranti single-phase switchboard. Particulars are given in our advertisement pages.

LIGHTING and POWER NOTES.

Bangor.—YEAR'S WORKING.—The income of the electricity department for the past year amounted to £3,562, and the gross profit was £1,886. The deficit on the year was £461, a decrease of £163, compared with 1912-13.

Belfast.—NEW PLANT.—In his interim report on the condition of the plant at the electricity works and the further development of the electricity undertaking, Mr. J. F. C. Snell advised the immediate purchase of a rotary transformer, the necessity for which was urgent, as, in the event of a breakdown, the tramway system might be temporarily held up. The Committee approved, and authorised the electrical engineer to advertise for one, the price being about £4,500.

Bradford.—The Electricity Committee has decided to supply energy to the Baths Committee for cooking and heating at the new Central Baths Annexe at ½d. per unit.

Burnham.—NEW MAINS.—The Slough and Datchet E.S. Co. has informed the P.C. that it intends laying cables from Fulmer to Farnham Common.

Canada.—According to the *Standard*, the new water-power development on the St. Lawrence, at Cedars Rapids, about 30 miles above Montreal, will be in operation by November 1st, when the first installation of 100,000 H.P. will be complete. The first unit of 10,000 H.P. is now being installed; the dredging of the canal, 2 miles long, 500 ft. wide, and 30 ft. deep, through which water will be led, and the various other works, are making good progress, and the company is well within the schedule laid down when the work was started some two years ago. The cost of the development will be $10,000,000. The company is largely backed by the Montreal Light, Heat and Power Co. and the Shawinigan Water and Power Co. It has contracts for the delivery of some 80,000 H.P. immediately on the completion of the plant.

Carlisle.—EXTENSIONS.—The T.C. has received the consent of the L.G.B. to borrow £7,427 for extensions of the electricity mains and plant, and that of the B. of T. to supply energy to Scotby House and the Croft. The Electricity Committee has decided to supply current to the Stanwix Garden suburb.

Cheshunt.—PROPOSED E.L.—The North Metropolitan E.P.S. Co. and the Waltham Abbey and Cheshunt Gas Co. have informed the U.D.C. that they are considering the question of supplying electricity in Cheshunt. The Council has deferred consideration of the matter pending the receipt of further particulars.

Chesterfield.—PROPOSED BULK SUPPLY.—The Electrical Energy Committee has been authorised to depute a sub-Committee to negotiate with the Staveley Coal and Iron Co. for a supply of electricity in bulk.

Continental Notes.—HUNGARY.—The Municipality of Fiume has decided to erect a factory for the electrical production of oxygen. It is also contemplating the erection of a hydro-electric station on the River Recina, some 10,000 H.P. being estimated to be available. A private offer has also been made to provide the city with an installation free of cost, on a 50 years' agreement, the plant lapsing to the city at the end of the term.

GERMANY.—The T.C. of Barmstedt (Schleswig-Holstein) has voted £5,000 for the erection of a power station. The erection of power stations has also been decided upon by the authorities at Hennersdorf (Silesia), Oberrotterbach (Pfalz), Bad Oldesloe, and Rödding (Kreis Hadersleben).

RUSSIA.—In a recent issue, the *Financier* mentions the following authorised or projected electricity undertakings in Russia:—The generating station at Warsaw is to be enlarged, including the installation of new turbo-generators, and the mains are to be considerably extended. The Minister of the Interior has authorised extensions, estimated to cost £168,125, at the generating station on the Vistula. The Town Councils of Kineshma and Sviyazhek are considering E.L. schemes. The Ekaterinodar Town Council has decided to acquire a Diesel engine plant and steam turbines, of a capacity of 1,500 H.P., at an estimated cost of £34,000. At Rostoff, on the Don, the Council contemplates expending £42,211 on its electricity undertaking, and is also considering the removal of the station from the centre of the town to the suburbs. A concession for E.L. at Bielaya Tzerkoff has been granted to Count Branitzky, with a condition that the station shall be completed by the autumn. It is stated that at Vladikavkaz, in the Caucasus, land on the River Rion has been granted to Messrs. Palashkovsky & Urbanovitch, engineers, for the construction of a hydro-electric station. All the energy produced is to be used at a factory to be built at Chiaturi for the production of ferromanganese, which has hitherto been handicapped by the want of fuel.

The municipal authorities of Nijni Novgorod are considering the establishment of a central station; the Archangel Municipality proposes both an electricity works and an electric tramway; and the Rovno Council has secured sanction to a loan of about £105,400 for the establishment of a central E.L. station.

NORWAY.—The electrical industry in Hardanger has, in the last few years, developed very rapidly, and it will in a few years' time have brought about 300,000 E.H.P. into operation. There is now to be erected a new large power station at Kinservik, where about 60,000 H.P. will be harnessed, and a railway is under construction for the transport of the building materials from the coast to the station. At Aalvik 100 men are employed in connection with the harnessing of the Björoo River, which will be capable of producing 80,000 H.P. in all. At the Tysse River at Odda, where some old water conduits are now being replaced by new ones, the amount of power utilised will soon be brought up to 125,000 H.P. The Osa Fossekompani, a new company, has submitted an application for a concession, which means the harnessing of about 50,000 H.P.

At the last meeting of the Government it was proposed to submit a Bill to the Storthing, by which the A/S Bremanger Kraftselskap will be granted a concession for which it has applied. The case in question comprises the acquisition of the water rights and the harnessing of the Svälgen River in Bremanger, which is able to produce 28,000 E.H.P. The water course includes three small lakes, which will be dammed and regulated, and the electrical power, according to the plans, will be generated in two separate power stations. The concession will be granted for a period of 65 years, and it is stipulated that the directors shall be Norwegian citizens, and that a certain portion of the capital shall be owned by Norwegians. The royalty to be paid to the State is fixed at 6½d. per H.P. per year for the first 10 years, 9½d. for the following five years, and 1s. 1d. per year for the remainder of the concession.

Dundee.—YEAR'S WORKING.—The result of the past year's working of the Corporation's electricity department shows a reduction in the net profit from the preceding year, which is accounted for by circumstances outside the control of the management. The cost of coal increased by £2,700, and the assessment, which increased by £600, now amounts to 20 per cent. of the total working expenses. Interest charges also increased by £1,300. The units sold numbered 12,062,228, an increase of two million units. The revenue was £58,783, an increase of £5,400. The net profit was £5,150, from which £1,643 has been taken to meet the loss on the Broughty Ferry undertaking, which was taken over during the year. The balance, £3,507, has been transferred to reserve. The charges for energy for heating and cooking are to be reduced.

East Grinstead.—PROV. ORDER.—The U.D.C. has appointed a Committee to consider the advisability of applying for a prov. order for electric lighting, the proposal being to establish works in conjunction with the new refuse destructor. It was also decided to ask Mr. J. B. Morgan, electrical engineer to the Horsham U.D.C., to confer with the Council's surveyor and report on the scheme.

Elland.—STREET LIGHTING.—The U.D.C. has decided to light Long Wall with electricity.

Friern Barnet.—PROPOSED E.L.—The Council has appointed a Committee to interview representatives of the Hornsey B.C. on the subject of a supply of electricity for the district.

Glasgow.—YEAR'S WORKING.—The income of the Corporation electricity department for the past year was £376,983, an increase of £32,735 over the previous year, while the number of units sold was 76,950,764, an increase of 13,767,701, which was entirely on sales to private consumers. The average price of energy to consumers was 1·156d. per unit.

Grimsby.—RATE RELIEF.—The T.C. has been recommended to pay £500, less income-tax, out of the surplus of the electricity undertaking to the relief of the rates, and to transfer the balance to the reserve fund.

Hereford.—The R.D.C. has consented to the application of the T.C. for permission to supply electricity in Holmer and Shelwick parish.

Horsham.—YEAR'S WORKING.—The gross profit on the U.D.C.'s electricity department for the year ended March 31st was £2,458. After paying loan instalments, £1,159, and interest, £840, the net profit was £459.

King's Lynn.—YEAR'S WORKING.—The net profit of the Corporation electricity department for the year ended March 31st last was £1,777, as compared with £876 in the previous year. The total income was £8,519, compared with £7,314, and the total expenditure £6,742, against £6,438. The energy sold was 669,874 units, at an average price of 2·66d. per unit, the previous year's total being 559,647 units at an average of 2·78d. The whole of the surplus is to be applied to the repayment of borrowed capital. A bonus of £40 was awarded to the engineer, Mr. C. W. Jackson, who planned and supervised the recent extensions to the works.

London.—BETHNAL GREEN.—The B.C. has been recommended to appoint Mr. Harold W. Couzens consulting electrical engineer to carry out its electricity scheme, at a fee of 5 per cent. upon the capital cost incurred, excluding amounts expended on land and buildings.

Manchester.—The T.C. has approved a recommendation of the Electricity Committee that the chairman, deputy-chairman and engineer be authorised to visit Paris, Berlin, New York, Boston, Philadelphia, Pittsburg, Chicago, Schenectady and Montreal to inquire into the most modern practice in regard to the design and equipment of large generating stations for economical production, and the lay-out of modern extra-high-voltage transmission systems.

New Zealand.—The Corporation of Invercargill proposes to borrow £10,000 for the extension of its electric lighting system.—*B. of T. Journal.*

Nottingham.—STREET LIGHTING.—The T.C. has referred to the Lighting Committee a proposal for experiments to be carried out in certain streets with centrally-suspended metal-filament lamps.

Pittington (Co. Durham).—PROPOSED LIGHTING.—A meeting of ratepayers has decided in favour of the adoption of the Lighting Acts.

Salford.—The T.C. having sought permission from Manchester to supply electricity to houses in Park Road, Crumpsall, the Manchester Gas Committee has decided that, inasmuch as this would mean a reduction in the consumption of gas in the houses in question, consent shall only be given on condition that the Salford T.C. contributes £1 per annum in respect of each house so supplied.

L.G.B. INQUIRY.—An unopposed inquiry was held on the 10th inst. by Mr. T. C. Ekin into the application of the T.C. for sanction to the borrowing of £13,500, for the supply of electricity to the docks of the Manchester Ship Canal Co.

PROPOSED LOAN.—The T.C. is to seek the sanction of the L.G.B. to a loan of £16,500 for a new turbo-alternator, to be purchased from the British Westinghouse Co. at a cost of £14,137, and for alterations to foundations and switchgear.

Stretford.—NEW PLANT.—The Electricity Committee has resolved to have a specification prepared, and to invite tenders, for an additional battery of 700 amperes' rating. The cost is estimated at £3,500.

The B. of T. has consented to overhead wires being attached to tramway standards in certain roads.

Sunderland.—PROPOSED LOAN.—The Electricity and Lighting Committee has decided to apply to the L.G.B. for sanction to borrow £12,000 for additional machinery and switchgear for sub-stations.

Swansea.—Owing to numerous applications for electricity for power purposes outside the borough, the T.C. has decided to apply to the B. of T. for powers to supply outside its area, in specific cases.

West Ham.—L.G.B. INQUIRY.—On Thursday last week an inquiry was held by Mr. H. R. Hooper into the application of the B.C. for sanction to borrow £3,621 for new works in connection with the electricity undertaking, and £3,085, the excess on previous loans. The Ratepayers' Association objected to the granting of the loans until the whole of the books of the Council had been audited by the Government.

Swinton and Pendlebury.—Year's Working.—The profit on the past year's working of the electricity undertaking was £34, compared with a deficit of £98 in the previous year.

Torpoint.—Proposed E.L.—After discussing letters from the promoters of the E.L. Co., one of which intimated that the scheme would not be carried out, and that the company would not be formed, while a later one withdrew this and said that the company would be formed without delay and the contract with the Council carried out, the U.D.C. has passed a resolution to the effect that it is of opinion that the letter of May 30th determines the contract of April 2nd, 1914, and it is undesirous of entering into further negotiations.

Tynemouth.—Half-Watt Lamps.—The Electricity Committee has resolved to supply energy for ½-watt lamps, using 1,000 watts, at 1½d. each per hour, the lamps to be provided and kept up by consumers.

Warrington.—Loan Sanction.—The T.C. has received sanction to borrow £4,950 for the purposes of the electricity undertaking, including £1,950 for a rotary converter, £650 for cables, £1,350 for armoured cables, and £1,000 for services.

Wimborne.—New Generating Station.—The U.D.C. has approved of a site, near Ethelbert Terrace, for the proposed electricity works.

Winchester.—Year's Working.—The total revenue of the Corporation electricity department for the past year amounted to £10,266, compared with £9,581 in the previous year. The gross profit was £7,819, compared with £6,692; and the net profit was £404 against £1,102, which has been carried to the reserve fund. The sales of energy increased during the year from 67,204 to 240,000 units for power; from 16,000 to 49,000 for heating and cooking; and from 9,000 to 16,000 for public lighting. Running costs were reduced by 17 per cent., despite an increase of 1s. 1d. per ton in the cost of coal.

TRAMWAY and RAILWAY NOTES.

Bristol.—Proposed Purchase.—As the result of a poll on the question of the purchase of the local tramways, 18,057 votes have been received in favour of municipal ownership and 14,894 against.

Canada.—Royal assent has been given to the London and Port Stanley Railway Bill, whereby the city of London is authorised to expend $700,000 upon the electrification of its steam railway to Port Stanley. Work will begin almost immediately, and it is expected that the electrified line will be in operation early next year.—*Canadian Engineer.*

Continental Notes.—Germany.—The Hessian Government has decided to spend £100,000 on the construction of an electric railway from Undenheim, *vid* Wörrstadt, to Bingen s/Rh.

Switzerland.—A credit of 38,500,000 fr. has just been voted to equip with electricity the St. Gothard line, and that from Estfeld to Bellinzona. Later on the Lucerne to Chiasso line will be converted to electric traction, the whole of these works being carried out with a view to the eventual conversion of the other lines. The construction is estimated to last four years.

Japan.—A sum of £250,000 is included in the current year's Budget of the Japanese Imperial Railway Board for the electrification of railways.

Linthwaite.—Tramway Extension.—The Huddersfield T.C. has notified the U.D.C. that it is about to extend the tramways from the Linthwaite terminus to Marsden, a distance of about 2½ miles.

Nottingham.—Year's Working.—The receipts of the Corporation tramway department for the past year amounted to over £175,000, an increase of £8,200 over the previous year. The passengers carried increased by 2 millions, the car-miles run by 57,000, and the expenditure by £148. The smallness of the increase in the working cost is due to the saving in energy resulting from a bonus scheme for drivers coming into force during the year, although the wages bill increased by £1,265.

Rotherham.—Proposed Extensions.—The B. of T. and the L.G.B. have approved of the applications of the T.C. for prov. orders for tramway and railless traction systems, and Bills to confirm these orders have been introduced into Parliament. No petitions in opposition have been lodged.

South Africa.—The undertaking of the Victoria Tramway Co. in Kimberley, on which the Kimberley City Council had an option of purchase at £35,000, has been taken over on a 25 years' lease by the De Beers Co. The fares are to be reduced from 6d. and 3d. to 2d. and 1d., which represents a reduction of £5,000 per annum in revenue, and will make the system the cheapest in South Africa. The Corporation will receive £900 per annum.

United States.—The final draft of the tentative agreement between the Philadelphia Rapid Transit Co. and the Council, providing for an elevated and underground electric railway for the city, has been completed. The details have not yet been made public, but it is understood that the construction of the system, except the tunnel to Camden, which is to be financed separately, will be paid for by the Council and leased to the company, which is to equip and operate it as part of one system. The company is also to lease the underground line to Camden. It is estimated that the Council will invest 45 to 50 million dollars, and the company from 11 to 15 million dollars, in the undertaking. The company will also assume rental obligations amounting to six million dollars.—*Railway Review.*

Warrington.—Year's Working.—There was a net profit of £3,239 on the Corporation tramway undertaking for the year ended March 31st last, compared with £2,981 in the previous year. The total income was £23,753, compared with £23,205, and the expenditure totalled £15,217, against £14,798. The average receipts per car-mile amounted to 12·246d., compared with 12·235d. The receipts on the Sankey route decreased from 8·895d. to 8·830d. per car-mile, probably on account of the competition from the motor-'buses. The profit has been carried to the appropriation account, increasing the balance in hand to £5,059, of which £2,500 is to be transferred in relief of rates.

TELEGRAPH and TELEPHONE NOTES.

Belgium.—The Government has formed a special Radio-telegraphic Department under the Ministry of Posts and Telegraphs; the wireless station at Nieuport Bains is to be brought up to date, and a new one will probably be erected at Antwerp. It is proposed to set up receiving stations at 35 centres, to receive the time signals from the Eiffel Tower.

Germany.—The new motor road near Berlin is being provided with an elaborate system of electric alarms for notifying accidents.

Japan.—So great is the demand for the installation of the telephone in Japan, that it is reported that the Japanese Department of Communications has drawn up a scheme for the extension of the system on a much larger scale than hitherto. The scheme provides for an expenditure of £400,000 per annum for a period of five years, during which time it is hoped to install about 70,000 telephones.

Parliamentary.—In the House of Commons on Monday, the Postmaster-General stated that with the completion of the underground cables from London to the landing places of the foreign cables, there would be no need to extend further the telegraph system, but where the telegraph overhead routes between large centres were locally congested the wires would be put underground.

Russia.—Until recently Russia had the distinction of being the only important country without international telephone connections. The Libau network has now been connected to the German system in Memel.

The Imperial Chain.—Discussing the Post Office vote in the House of Commons last week, Sir Henry Norman commented on the slow progress that was being made with the erection of the Imperial wireless stations, and pointed out that the Marconi Co. was establishing a monopoly in wireless communication, which would be disastrous to the public interest.

The Postal Service.—In a discussion of the Post Office vote, on Wednesday last week, the conclusions of the Holt Committee were severely criticised by many speakers in the House of Commons, and a Government defeat appeared imminent; the Postmaster-General, however, at the instance of the Labour Party, agreed to appoint a Committee of five experts outside the House to consider the matter, and to report. He added that the Government would set up some body to inquire into the future relations of the State and the employés of the various Government Departments, and accepted the principle that there should be some body outside the House that would stand between the State and its employés and adjust their differences.

Stirling.—The Tramways Committee has had a conference with representatives of the County Council with reference to the proposed electric tramways from Bridge of Allan to Bannockburn. The County Council will give careful consideration to the proposals, and will not act in an obstructive spirit. Power will be supplied from the Council's electricity works. A single line is suggested, except through the town of Stirling. The Town Council suggests that it shall be responsible for the maintenance of the rails, and that the County Council shall undertake the maintenance of the track outside the burgh. The Council agreed that its views should be communicated in writing to the County Council and Bridge of Allan Town Council, and that the Stirling and Bridge of Allan Tramways Co. should be asked to name a price at which they would be prepared to sell their present undertaking.

CONTRACTS OPEN and CLOSED.

OPEN.

Alford.—June 27th. Public lighting, for the U.D.C. Mr. T. N. Loy, Clerk.

Atherton.—June 24th. E.H.T. cable switchboard and transformers for the Electricity Department. Mr. C. T. Astbury, Resident Engineer.

Australia. — SYDNEY. — July 20th. Box compound, meters, maximum-demand indicators, arc lamp carbons, and straight-stem insulators, for the Council. Specifications for each section 10s. 6d., from City Electrical Engineer, Town Hall.

July 20th. Municipal Council. 33,000-volt insulators (Contract No. 278); two coal conveyers, motors, &c. (Contract No. 307). Copies of particulars can be seen at the Board of Trade Commercial Intelligence Department in London.

Department of Public Works. 4,000 tons of 100-lb. and 850 tons of 109-lb. grooved steel rails for tramways.

August 31st. Sydney Harbour Trust. Four electrically-operated semi-portable travelling cranes. Forms of tender from Mr. H. F. Norrie, Secretary to the Trust, Sydney.

PERTH.—August 5th. Copper wire and binders, for Postmaster-General. See "Official Notices" to-day.

August 5th. Telephone instruments and parts. Telegraph accumulators and power board, Kalgoorlie, for Postmaster-General. See "Official Notices" to-day.

August 12th. Cable, lead-covered and various, for Postmaster-General. See "Official Notices" to-day.

August 12th. Insulators, for Postmaster-General. See "Official Notices" June 12th.

August 19th. Electric lamps and fittings, for Postmaster-General. See "Official Notices" to-day.

MELBOURNE.—July 28th. Testing apparatus for the P.M.G. See "Official Notices" to-day.

July 6th. Rotary converters and frequency changers, for Melbourne Suburban Railways. See "Official Notices" June 5th.

July 6th. Electrically-operated car-shed cranes for Melbourne Suburban Railways. See "Official Notices" June 12th.

August 26th. Eight 50-ton, one 30-ton, and three 10-ton electric overhead travelling cranes for Victorian State Railways. Specification, &c., from Messrs. John Coates & Co., Ltd., 115, Victoria Street, S.W.

Aylesbury.—July 6th. U.D.C. Lighting and power switchboard with connections, battery of accumulators, underground mains, including house services, conversion of existing lamp standards, &c. See "Official Notices" June 12th.

Ballaghadereen.—July 6th. Hydraulic turbine and accessories, dynamo and reducer set, aerial line, switchgear, for the Electricity Committee. See "Official Notices" to-day.

Ballsbridge (Dublin).—June 27th. U.D.C. Twelve months' supply of steam coal, for the Pembroke U.D.C. Electricity Works. Specification from the Town Hall, Ballsbridge.

Beckenham.—June 22nd. U.D.C. Evaporative condenser (500-KW. set). See "Official Notices" June 12th.

Bolton.—July 19th. Corporation. Converting plant, sub-station E.H.T. and H.T. switchgear. See "Official Notices" June 12th.

Doncaster.—June 22nd. Light railway extensions for Corporation Tramway Department. Specification, &c. (10s., not returnable) from the Borough Engineer, 3, Priory Place.

Dublin.—June 25th. Corporation. Feed pump, tanks, pipework, &c. See "Official Notices" June 5th.

Exminster.—June 29th. Electrical appliances for a year for the Devon County Lunatic Asylum. Mr. H. E. Morgan, Clerk.

France.—SEINE.—June 26th. Supply, in 10 lots, of lead-covered telephone cable, and of rubber and cotton-covered copper wire, two lots. Particulars, Sous-Secretariat d'Etat des Postes et des Télégraphes, 103, Rue de Grenelle, Paris.

Glasgow.—June 25th. Corporation. Electric light installation at the stables, stores and workshops, Graeme Street, for the Corporation. Forms of tender from Mr. W. Greig, 20, Trongate.

Guisborough.—July 2nd. U.D.C. Cables, transformers, sub-station equipments and fittings, for the U.D.C. Specifications (£1) from Messrs. May & Hawes, Consulting Engineers to the Council, Caxton House, Westminster, S.W.

Harrogate.—June 22nd. Corporation. Economiser, 288 pipes, for Electricity Department. See "Official Notices" May 29th.

Hoylake and West Kirby.—June 26th. Coal (washed peas, about 3,500 tons) for the U.D.C. electricity works. Mr. C. J. Turner, Electrical Engineer.

Huddersfield.—22nd June. Electric light installation at Crosland Moor Institution. Mr. T. W. Armitage, Clerk to the Guardians, Union Offices, Ramsden Street.

Hull.—June 16th. Electrical requirements for the B. of G. Mr. R. H. Winter, Clerk, St. Mary's Chambers, Lowgate.

Keymer (Sussex).—June 27th. Public lighting, for the P.C. Mr. H. Plummer, Clerk, Lyntonville, Hayward's Heath.

Leeds.—June 29th. Corporation. Air-cooled transformers. See "Official Notices" May 22nd.

Lincoln.—Coal (cobbles or slack) for a year, to the Corporation Electricity Works. Engineer, Brayford Side North.

London.—L.C.C.—June 23rd. 50, 100 or 150 complete trailer-cars, and equipment of 200 existing electric motor-cars with couplers and traction gear for drawing trailer-cars. See "Official Notices" May 29th.

June 30th. 150 sets plough collector gear. See "Official Notices" June 12th.

July 13th. One, two or three electrically-driven chassis, for Fire Brigade. See "Official Notices" to-day.

July 14th. Five rotary converters of 1,500 KW. each, 15 main static transformers, two starting static transformers, and re-erection, &c., of existing motor generators. See "Official Notices" to-day.

July 30th. 10,000 or 5,000 driving and pony wheel tramcar tires, 300 axle forgings for tramcars. Chief Officer, Tramways Department, 62, Finsbury Pavement, E.C.

CITY.—The Music Committee of the Court of Common Council is to spend £400 on altering the electric lighting arrangements of the stage at the Guildhall School of Music.

BATTERSEA.—June 24th. B.C. Coal telpherage plant. See "Official Notices" May 29th.

HACKNEY.—The B.C. Electricity Committee recommends that tenders be invited for the supply of white open-type and yellow flame arc lamp carbons for the public lighting service.

ST. PANCRAS.—June 25th. B.C. Large water-tube boilers. See "Official Notices" June 5th.

H.M. OFFICE OF WORKS.—June 30th. Wiring public offices extension, Westminster, S.W. See "Official Notices" June 12th.

July 1st. Twelve months' supply of incandescent electric lamps. See "Official Notices" to-day.

July 7th. Three years' supply of electrical accessories. See "Official Notices" to-day.

Manchester.—June 26th. Corporation. Potential and current transformers, C.C. and A.C. motors, electricity meters, C.C. motor-starting switches and three-phase star-delta switches. See "Official Notices" June 12th.

Morecambe.—June 25th. Corporation. 2,500 tons of coal or slack, for the Electricity Supply Department. See "Official Notices" May 29th.

New Zealand. — AUCKLAND. — August 6th. Three 750-KW. D.C. mixed-pressure turbo-generators; one 1,500-KW. three-phase turbo-generator, including auxiliary plant and sub-station equipment. See "Official Notices" May 22nd.

July 27th. Electricity meters, &c., for the Borough of Tauranga. Specifications (£1), from H. W. Climie and Son, Hastings, N.Z.—*N.Z. Shipping and Commerce.*

Norway.—June 29th. Norwegian State Railways. Electric clocks for the Narvik district. See *Board of Trade Journal.*

Peterborough.—Coal, for the Corporation Electricity Works. Electrical Engineer.

Rochester.—June 30th. Corporation. Electric lighting of the Corn Exchange Buildings. See "Official Notices" to-day.

Rochdale.—July 1st. Corporation. 94 wet-air filter. (1914.) See "Official Notices" to-day.

Rotherham.—July 8th. Corporation. Tramway stores, coals, cables, meters, &c. See "Official Notices" to-day.

Salford.—June 26th. Corporation. Switchboard for the docks sub-station. Specification from the Borough Electrical Engineer, Electricity Works, Frederick Road Pendleton.

Stalybridge.—June 27th. 12 months' supply of stores for the Joint Tramways and Electricity Board. Specifications and form of tender obtainable from Mr. R. Blackmore, Engineer-in-Chief, Generating Station, Stalybridge.

Swansea.—June 25th. Corporation. Main generating station and sub-station. Extra H.T. and L.T. switchgear. See "Official Notices" June 5th.

June 22nd. Steam coal, for the Corporation electricity works; Borough Electrical Engineer.

Sweden.—July 4th. Royal Swedish Water Power Administration. Four transformers. Specifications from, and tenders to, "Kungl. Vattenfallsstyrelsens Elektrotekniska byra, Regeringsgaten 45," Stockholm; no special form of tender is required. A specification (in Swedish) may be seen at the Commercial Intelligence Branch of the Board of Trade, London.

Skelton and Brotton.—July 2nd. U.D.C. Overhead lines, underground cables, transformers, sub-station equipment, public lighting fittings. See "Official Notices" June 12th.

Spain.—June 28th. Municipal authorities of Motrico (Province of Guipuzcoa). Concession for the electric lighting of the town during a period of five years.

June 29th. Municipal authorities of Cornella de Llobregat (Province of Barcelona). Concession for the electric lighting of the town during a period of 30 years.

June 30th. Municipal authorities of Llanes (Province of Asturias). Concession for the electric lighting of the town.

Walsall.—July 14th. Corporation. Four water-tube boilers, superheaters, economisers, pumps, pipes, &c. See "Official Notices" to-day.

July 14th. Corporation. Two 3,000-KW. turbo-alternators with surface condensers, motor generator. See "Official Notices" to-day.

Warrington.—July 3rd. Electric equipment, &c., for transporter bridge over the River Mersey, for Jos. Crosfield & Sons, Ltd. Drawings, &c. (£2 2s.) from Mr. W. H. Hunter, M.I.C.E., 42, Spring Gardens, Manchester.

York.—June 25th. Corporation. H.T. overhead line material. See "Official Notices" to-day.

CLOSED.

Aberdare.—The U.D.C. has received the following tenders for a refuse destructor :—

Heenan & Froude	(accepted)	£8,416
Meldrums, Ltd.		8,455
Hughes & Stirling		8,523

Australia.—SYDNEY.—The City Council has received the following tenders :—

Fibre conduits.—Haes & Eggers, £703 (recommended); Noyes Bros., £828.
Transformers (outdoor).—Australian G.E. Co., £3,173; N. Guthridge, Ltd., £3,210; British G.E. Co., £3,535; Noyes Bros., £3,825; Standard, Waygood, Hercules, Ltd., and Australian Metal Co., schedule.
Transformers (indoor.)—Noyes Bros., £1,802; N. Guthridge, Ltd., £1,962; British G.E. Co., £2,268; Gardiner, Woern & Co., £2,445; Australian G.E. Co., £2,474; Standard, Waygood, Hercules Co., Ltd, Siemens Bros. and Australian Metal Co.

MELBOURNE.—Postmaster-General's Department :—
Automatic switchboard at Brighton Telephone Exchange, and apparatus for equipping junction lines at Manual Exchange, £15,951.—Automatic Telephones (Aus.), Ltd.
C.B. multiple switchboard, £17,772.—Western Elec. Co. (Aus.), Ltd.
Strips relays, £151.—Siemens Bros. Dynamo Works Co., Ltd.—*Australian Mining Standard.*

Aylesbury.—The T.C. has provisionally accepted the tender of Messrs. Willans & Robinson, Ltd, for Diesel engines and plant, at £4,753.

Bedford.—On the recommendation of the Electricity Committee, the following tenders for pipework in connection with the new alternator, have been accepted :—

R. Jeakings.—21 in. conduit and pipework	£321
W. H. A. Robertson & Co, Ltd.—Steam and exhaust pipework	495

Belgium.—Eleven concerns—seven German, two Belgian, and one each French and Italian—last week submitted tenders to the Belgian Post and Telegraph authorities in Brussels, for the supply of a quantity of telephone cables. The lowest offer was that of the A.E.G.-Union Electrique Co., of Brussels.

Bolton.—The Tramways Committee has accepted the tender of Messrs. Hadfields, Ltd., for special track work in connection with the relaying of Manchester Road and Great Moor Street tramways.

The Electricity Committee has accepted the tender of Messrs. Jas. Baxendale & Sons for metal air-ducts.

Bristol.—The Docks Committee has accepted the tender of Messrs. Siemens Bros. & Co., Ltd., for the supply of 19/14 S.W.G. electric cable.

Government Contracts.—The following tenders have been accepted during the past month by the Government Departments named :—

ADMIRALTY.—CONTRACT DEPARTMENT.
Motors and controllers.—Laurence Scott & Co., Ltd.

WAR OFFICE.
Hand telephones.—Automatic Telephone Manufacturing Co.
Electric lamps.—Corona Lamp Works, Ltd.; Cryselco, Ltd.; Dick, Kerr and Co., Ltd.; Rugby Lamp Co., Ltd.; Stearn Electric Lamp Co., Ltd.

CROWN AGENTS FOR THE COLONIES.
Diesel engines, &c.—Willans & Robinson, Ltd.
Telegraph poles.—Bullers, Ltd.
Copper wire.—F. Smith & Co.; T. Bolton & Sons, Ltd.

INDIA OFFICE.
Wireless apparatus.—Marconi's Wireless Telegraph Co.
Dynamos.—Lancashire Dynamo Co., Ltd.

POST OFFICE.
Laying lines of ducts, Newcastle-Sunderland.—James McLaren, junr.
" " Chatham-Sheerness.—A. H. Ball & Co., Ltd.
" " and pipes, Eastbourne.—Peerless, Dennis & Co., Ltd.
" " " Leeds.—J. A. Ewart, Ltd.
Sub-station electrical equipment, Birmingham.—British Thomson-Houston Co., Ltd.
Telephone exchange equipment, Devonport.—Western Electric Co., Ltd.
" " " extension, Worthing.—Automatic Telephone Manufacturing Co., Ltd.
Telegraphic apparatus.—Elliott Bros.; Siemens Bros. & Co., Ltd.
Telephonic apparatus.—B.I. and Helsby Cables, Ltd.; British L.M. Ericsson Manufacturing Co., Ltd.; International Electric Co., Ltd.; Peel-Conner Telephone Works, Ltd.; Phœnix Telephone and Electric Works, Ltd.; Western Electric Co., Ltd.
Battery boxes.—Standard Woodwork Co., Ltd.
Telephonic cable.—B.I. and H. Cables, Ltd.; Henley's Telegraph Works Co., Ltd.; Siemens Bros. & Co., Ltd.
Stoneware ducts.—T. Wragg & Sons, Ltd.
Metallic-filament lamps.—British Thomson-Houston Co., Ltd.; Edison and Swan United Electric Light Co., Ltd.; General Electric Co., Ltd.; Siemens Bros. Dynamo Works, Ltd.
Telegraph paper.—Waterlow & Sons, Ltd.
Insulator spindles.—F. W. Cotterill, Ltd.; Guest, Keen & Nettlefolds, Ltd.; T. W. Lench, Ltd.
Bronze wire.—T. Bolton & Sons, Ltd.; B.I. and H. Cables, Ltd.; Shropshire Iron Co., Ltd.; F. Smith & Co., &c., Ltd.
V.I.R. wire.—C. Macintosh & Co., Ltd.
Leclanché zinc rods.—Siemens Bros. & Co., Ltd.

G.N. Railway.—The Brimsdown Lamp Works, Ltd., has obtained the contract for the supply of metallic-filament lamps to the Great Northern Railway Co.

Gravesend.—The tenders of the British Thomson-Houston Co. at £999 (plus £28 for switches of a size larger than specified), and of Messrs. B. R. Rowland & Co. at £434 (or £418 without fan), have been accepted by the Council for extending the switchboard and fitting automatic stokers to two boilers at the Electricity Works. In the latter case the engineer is to have the fan fitted if he considers it desirable. The tender of Mr. A. E. Tong has also been accepted at £367 for extending the switchboard platform and building a high-tension room.

London.—STOKE NEWINGTON.—The B.C. Electricity Committee recommends the acceptance of the quotation of the Union Cable Co., Ltd., for the supply of cable for 12 months.

BERMONDSEY.—The B.C. is being recommended to accept the tenders of Messrs. A. Usher & Co. and Messrs. Bradbury, Sons and Co., Ltd., for an annual supply of Wingfield small nuts through 1¼ in. and over 1¼ in. screen Derby, at 16s. 2d. per ton, and Gedling nutty slack, 1¼ in. Notts, at 13s. 8d. per ton respectively.

HAMMERSMITH.—The B.C. Electricity Committee reports the receipt of the undermentioned tenders for cable ducts required to March 31st, 1915.

	Price per yard.				Split ducts.			
	1 way	2 way	3 way	4 way	1 way	2 way	3 way	4 way.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Sutton & Co... ..	1 6⅜	2 5½	3 6¾	4 8½	1 5	3 3	4 9	5 8½
Doulton & Co. ..	1 6⅜	—	—	—	1 4	—	—	—
T. Wragg & Sons ..	1 0½	2 4½	3 4½	4 1½	0 8½	1 2½	1 8½	2 0⅜
Albion Clay Co. ..	1 0½	2 7½	3 9½	4 7	1 0⅜	2 7½	3 9½	4 7
Mansfield.	1 0½	2 4½	3 5	4 2	0 8½	1 7	2 3½	2 9½
Oates & Green, Ltd.	11	2 0	2 10	3 8	—	Nos quoted.		—

The Committee recommends that subject to the sample ducts proving satisfactory, the tender of Messrs. T. Wragg & Sons be accepted.

For the supply of air-cooled static transformers tenders were received from the following firms, viz., the British Electric Transformer Co., Ltd., Foster Engineering Co., Ferranti, Ltd., Brush Electrical Engineering Co., Burnand & Co., Willem Smet and Co., and Brown, Boveri & Co. The Committee reports that the tender of the British Electric Transformer Co. was the lowest received for the six 100-KW. and for the 200-KW. transformers For the 50-KW. the firm were second on the list, but upon the report of the engineer this tender is also recommended.

The Metropolitan Asylums Board has accepted tenders from the following firms for annual supplies :—General Electric Co., Ltd., Baxter & Caunter, Ltd., Veritys, Ltd., Siemens Bros. Dynamo Works, Ltd., Sterling Telephone and Electric Co., Ltd.

Manchester.—The Tramways Committee has accepted the tender of Messrs. Chambers, Scott & Co., Ltd., for a rail-bending machine; and that of Messrs. Paulding & Co. for the supply of block tin.

The Baths and Wash-houses Committee have accepted the tender of Messrs. L. E. Wilson & Co. for electric lighting at the new Quay Street Baths.

The following tenders have been accepted by the Electricity Committee :—

L.T. switchboard for Stuart Street Station.—Ferguson, Pailin & Co.
Foundations for additional cooling towers.—C. H. Normanton & Son, Ltd.
C.I. pipes and valves for water coolers.—J. H. and A. Coulthurst, Ltd.
Cables.—Johnson & Phillips, Ltd., and B.I. and Helsby Cables, Ltd., and W. T. Glover & Co., Ltd.

New Zealand.—The Auckland City Council has accepted the tender of Messrs. Riley & Co., at £1,850, for insulated cable.—*Tenders.*

Ramsbottom.—The U.D.C. has placed an order with the R.E.T. Construction Co., Ltd., for two railless traction vehicles.

Salford.—The T.C. has accepted the tender of the British Westinghouse Electric and Manufacturing Co., Ltd., amounting to £14,137, for a 5,000-KW. turbo-alternator at the electricity station.

South Shields.—Messrs. Johnson & Phillips, Ltd., have received an order for providing, drawing into cast-iron conduits and jointing up complete, a low-tension electric cable system at New Dock, South Shields.

South Wales.—The contract for a double inlet Keith reversible mine fan, to handle 400,000 cb. ft. of air per minute at 6-in. water gauge, to be installed at Nantgarw Colliery, South Wales, has been placed with the James Keith & Blackman Co., Ltd.

Sunderland.—The T.C. has accepted the following tenders on behalf of the Electricity and Lighting Committee:—

Phœnix Dynamo Co.—Feeder booster.
J. W. White.—Repairs to electricity works and sub-stations.
Ferranti, Ltd.—Transformer and meters.
Siemens Bros. Dynamo Works.—Meters.
Morgan Crucible Co., Ltd.—Carbon brushes.
J. Allen, Senr. & Son, Ltd.—Cast-iron box frames and covers.
B.I. & Helsby Cables, Ltd.—Cable.
Hans Renold, Ltd.—Chain drive for stoker.

Swansea.—The Harbour Trust has accepted the following tenders:—

General Electric Co., Ltd.—Generator and switchboard extension in central sub-station.
British Thomson-Houston Co., Ltd.—Voltage regulator.
E. Sisterton.—300 tons of rails.
W. Richards & Co; Ltd.—Electric cable.
Harland Engineering Co.—Crane plug boxes.

Tynemouth.—The tender of the Macintosh Cable Co. is recommended to the Council for acceptance at £412 for a supply of cable.

Wallasey.—The Corporation has made a contract with the British Thomson-Houston Co., Ltd., for 12 months' supply of their type R.H. A.C. meters.

The T.C. has accepted the following tenders in connection with the new generating station:—

Transformers.—Messrs. Ferranti, Ltd., £1,304.
Three steel chimneys.—M. Louis Prat, £1,084.

West Bromwich.—The T.C. has accepted the tender of Messrs. C. L. Wells, Ltd., for the supply of four motor-'buses.

Woolwich.—The tender of Messrs. Mechan & Son, Ltd., has been accepted by the Borough Council, at £357, for a supply of main circulating water pipes required in connection with the extension of the Globe Lane Electricity Works.

THE ELECTRICAL ENGINEERS
(LONDON DIVISION).

Commanding Officer—LIEUT.-COL. H. M. LEAF.

The following orders have been issued:—

Friday, June 12th.—"D" Company. Infantry drill, 7 to 8.30 p.m. Technical instruction, 8.15 to 10 p.m. Miniature range instruction, 8.15 to 10 p.m.

Saturday, June 13th.—All Companies. Annual course of musketry at Purfleet rifle ranges. Headquarters will be opened for regimental business from 10 a.m. till 12 noon.

Monday, June 22nd.—"A" Company. Infantry drill, 7 to 8 p.m. Technical instruction, 8 to 10 p.m.

Tuesday, June 23rd.—Advance party for Berehaven Camp will parade at headquarters at 12 noon. "B" Company.—Infantry drill, 7 to 8 p.m. Technical instruction, 8 to 10 p.m.

Wednesday, June 24th.—All Companies. Rating examination will take place from 7 to 8.30 p.m.

Thursday, June 25th.—"C" Company. Infantry drill, 7 to 8 p.m. Technical instruction, 8.15 to 10 p.m.

Friday, June 26th.—"D" Company. Infantry drill, 7.30 to 8.30 p.m. Technical instruction, 8.45 to 10 p.m.

Saturday, June 27th.—Main body for Berehaven Camp will parade at headquarters at 12 noon. Regimental business will be transacted till 12 noon.

(Signed) F. R. HOLT-WHITE, Capt. R.E., Adjutant,
For Officer commanding L.E.E.

FORTHCOMING EVENTS.

Municipal Electrical Association.—Friday and Saturday, June 19th and 20th. At Birmingham. Annual Convention. Concluding meetings.

National Physical Laboratory.—Friday, June 19th. At 3.30 p.m. Annual inspection.

Physical Society of London (Fellows only).—Saturday, June 20th. (Morning.) Visit Cambridge Scientific Instrument Co.'s Works. (Afternoon.) Visit to Cavendish Laboratory.

Salford Technical and Engineering Association.—Saturday, June 20th. Visit, Broadheath.

University of London.—Tuesday, June 23rd. At 8.30 p.m. At University College. Conversazione.

Institution of Electrical Engineers.—Thursday, June 25th. At 9 p.m. At the Natural History Museum, South Kensington. Annual Conversazione.

Batti-Wallahs' Society.—Saturday, June 27th. River trip.

North of England Institute of Mining and Mechanical Engineers.—Saturday, June 27th. Visit to Home Office Experimental Station at Eskmeals.

ITALIAN ELECTRICAL PROGRESS IN 1912-13.

ITALIAN electrical enterprise in 1912-13 is passed under a comprehensive review by the *Nachrichten für Handel und Industrie* as follows:—Of the large electrical undertakings of Italy only four in the year 1912 (as against three in 1911) failed to pay a dividend. Of the remaining 26, 14 paid the same dividend, nine a higher dividend, and three a smaller dividend. In the aggregate dividends increased from 6·56 to 6·96 per cent. In the matter of the amount of capital invested, that of the industry supplying electrical energy stood above all others. On the other hand, there is much foreign, and in particular Swiss and Belgian, capital invested in it. Its favourable situation is due to the fact that the relation of capital to reserve in it is second only to that in the chemical industry; against an aggregate capital, for instance, of 491 million lire, there is a reserve of 51 million lire—*i.e.*, 10·4 per cent. of the capital. The capital increases, including the new formations (some 10 million lire), totalled in 1912 (deduction made of undertakings which were dissolved, or whose capital was written down) upwards of 40 million lire. Of the 12 companies which increased their capital may be cited the following:—

	Mill. lire.
Officine Elettriche Genovesi, at Genoa	from 17 to 20
Società Elettrica Riviera de Ponente	„ 12 to 20
Società per lo Sviluppo delle Imprese Elettriche in Italia, at Milan	„ 4 to 10
Società Adriatica de Elettricità, at Venice	„ 12 to 15
Società Varesina per le Imprese Elettriche, at Varese	„ 6 to 7

The Officine Elettriche Genovesi again distributed in 1912 (with a net profit of 1·7 million lire, against 1·6 million lire in 1911) a dividend of 10 per cent., and decided, after increasing its capital, to augment its bond debt from 12 to 20 million lire, four millions of which amount was issued, at 4½ per cent. interest, by June, 1913; it is intended to issue the balance gradually as pecuniary needs require. The new shares were taken over by the Elektrobank, of Zurich, and six million lire of the shares of 1910 and 1912 were offered to the shareholders at 135 per cent. The company enlarged its network by an addition of 79 km., so that on December 31st, 1912, it totalled 1,522 km., and extended the lighting equipment of the city of Genoa, and of the port and of the outside communes, and also augmented the number of customers connected to its network from 32,944 to 38,167. For 1913 were projected, besides the reconstruction of the transformer stations on the Riviera di Levante, the inauguration of the long-distance line from Recco to Riva Trigoso, then approaching completion, with a view to annexing to its distributing network the large industrial centres there located. The Unione Italiana Tramways Elettrici, which derives its motive power from the Officine Elettrichi Genovesi, and, like it, stands in close relation with a German firm and with the Bank für Elektrische Unternehmungen (Elektrobank), at Zurich, distributed a dividend of 9½ per cent., against 9 per cent. in 1911.

The character of the progress which the distribution of electrical energy is making in Italy is shown by the Governmental statistics of the number of concessions granted for the utilisation of water-power by electrical undertakings. According to the last published returns, for the statistical year 1910-11, there were altogether 125 of such concessions granted, for the working of undertakings aggregating 80,000 H.P., which raised the grand total of water-power used for the production of electrical energy to 966,000 H.P. These figures are allocated as follows:—678,000 to Northern Italy, or more than two-thirds; 215,000 to Central Italy, and 61,000 to Southern Italy and the Italian Islands.

Although it is not to be denied that there has been a slackening of the increase in the consumption of electric power for the driving of machinery and for lighting purposes in certain regions, and notably in the North, in consequence of the general situation and the crisis in the cotton industry, nevertheless, the call for railway and tramway working, with the many electric conversions constantly being launched, has created a compensatory consumption of no mean importance. In this connection may be mentioned that the Società per le Forze Idrauliche della Maira recently arranged a contract with the Railway Administration for the installation of electric working on the Giovi auxiliary line from Sanpierdarena (Genoa) to Ronco, which is a parallel line to that from Pontedecimo to Busalla, lately converted. With this business the German Negri group previously mentioned was intimately associated, and it is also concerned in the electrification of the Riviera line from Genoa to Ventimiglia and the supply of motive power to the Savona to San Giuseppe section. There is also observable a strong movement in favour of the electrification of the Genoa-Campoligure-Ovada-Asti line.

New water-power installations of considerable importance were sanctioned by the Italian Parliament last summer. They had to do with the erection of great storage dams and water-power installations in Calabria and Sicily through the exploitation of the Sola and Tirso rivers. These dams were to have an extent greatly surpassing the largest existing European reservoirs, their overflow yielding some 150,000 H.P. to be used for industrial purposes, and in Calabria, more especially, distributed by a network of 300 to 400 km. over a very wide region.

Furthermore, with the erection of these dams, whose construction will cost upwards of 60 million lire, is bound up the purpose of improving agriculture. In Sardinia especially, the collected waters will be used to irrigate the great plain stretching from Cagliari to the north-west, thereby supplying fodder for the cattle and horse-raising industries there, the most important in Italy, and freeing them from the existing food scarcity. In the same way a regulated water system in Calabria will benefit the districts lying at the foot of the hills by securing them from droughts on the one hand and from floods on the other, with their concomitant of malarial fever, &c. The concession for the reservoirs in Calabria has been granted to the Società per le Forze idrauliche della Sila.

T

"By t
works
known
attaine
quality
often
in con
neers'
as ade
fining
article.
firm's
are by
confine
tumble
while th
solid fo
which t
tion wa
they als
number
switche
cut-ou
2,000
rating,
struct m
and po
boards
volts, i
large qu
and dist
attentio

Since t
Mr. J. H
the firm'
larger pre
the accon

THE WORKS OF MESSRS. J. H. TUCKER & CO., HAY MILLS.

"By their works ye shall know them"; and probably the works by which Messrs. Tucker & Co. are most widely known are the familiar "Tucker switches," which attained the rare distinction of setting a standard of quality that has often been quoted in consulting engineers' specifications as adequately defining a first-class article. But the firm's operations are by no means confined to small tumbler switches; while these form the solid foundation on which their reputation was built up, they also make large numbers of knife switches and fusible cut-outs, up to 2,000 amperes' rating, and construct main lighting and power switchboards and switchgear generally, for pressures up to 600 volts, in all sizes that are called for. They also turn out a large quantity of ironclad switches, service fuse-boxes, fuse and distributing boards, &c., paying in this respect special attention to the requirements of the Home Office.

Fig. 1.—Assembling "Tucker" Switches.

Since the founding of the business some 20 years ago by Mr. J. H. Tucker, who is now, as then, the mainspring of the firm's activity, the works have thrice been moved to larger premises, and three times the business has outgrown the accommodation at command; the present site, a few miles outside Birmingham, in a rising industrial district, covers four acres, of which one-half is occupied, and the employés number about six hundred. The buildings were erected six years ago by the company, and further extensions are already under consideration.

The front of the building on King's Road comprises the finished goods warehouse and dispatching department on the ground floor, with the offices above; the latter adjoin a gangway running across the end of the works, and joining longitudinal galleries at either side. The offices are divided into sections corresponding to the various departments, including a large drawing office, staff mess-room, and a recently equipped showroom. Intercommunication telephones, with some 30 lines, connect up the different offices and works.

No electricity supply being available in the neighbourhood at the time when the works were erected (but the Birmingham Corporation has now laid mains there), power is provided by gas engines fed with town gas. A 40-kw. dynamo driven by a National gas engine, with a storage battery, supplies electricity for lighting and a proportion of power, but the bulk of the driving is effected by three

Fig. 2.—Switch Bay and part of Press Department from the West Gallery.

other engines, one being a 75-H.P. Crossley of the latest throttle-governed type, and another a 58-H.P. National engine.

With the exception of the cabinet-making shop, electric light station and annealing house, which are situated in the goods receiving yard alongside of the works, all the departments are accommodated under one roof. A large stock of raw material is kept in hand, the only items that are not manufactured throughout in the works being iron castings and porcelain parts. A spacious and well-equipped tool-room is also provided, in which all of the numerous tools, dies, jigs, &c., employed in the works are made. The manufactured products may be classified under three heads: tumbler switches, accessories, and switchgear, and the works are nominally divided correspondingly into press and automatic machine departments, machine shop, and assembly departments, in addition to which are the various stores, pattern shop, experimental department, and what we may call the finishing shop, where polishing, plating, dipping and lacquering processes are carried on.

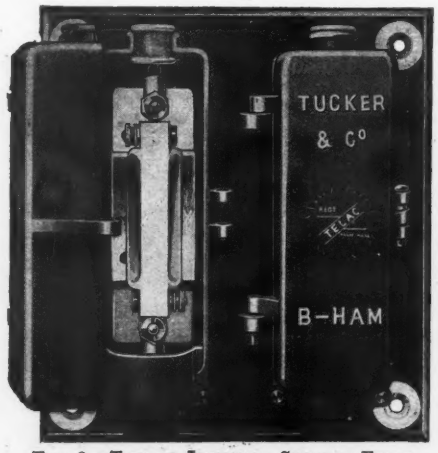


Fig. 3.—Tucker Ironclad Service Fuses.

Naturally, a great deal of the work is done with hand and power presses, and the press department occupies a large area, near the front of the building; parts of it appear in two of the views which accompany this article. Beyond this are 33 automatic machines, which turn out all the screws, dollies and similar parts. More than half a million small turned parts and small screws are required every week. Some extremely ingenious devices are employed in this department for certain processes, such as the screwing of lampholder barrels with chasers, which carry out the operation in six stages, producing a practically perfect thread. The switch parts are made to limit gauges, with an allowance of ½ a mil up or down. Certain parts of switches and small fuses are made on semi-automatic machines. Most of the work is piece-work, and after each process the parts go into the stores, whence they are re-issued for further manufacture; those that undergo several operations in the press department are annealed at intervals in a coke-fired furnace. Tumbler switches are assembled in one of the side galleries, where they are also carefully inspected before passing into store; cheap switches are apt to be found inaccurately adjusted on delivery, but this cannot be said of the Tucker switches, in

Fig. 4.—Machine Shop.

Fig. 5.—Switchgear Bay.

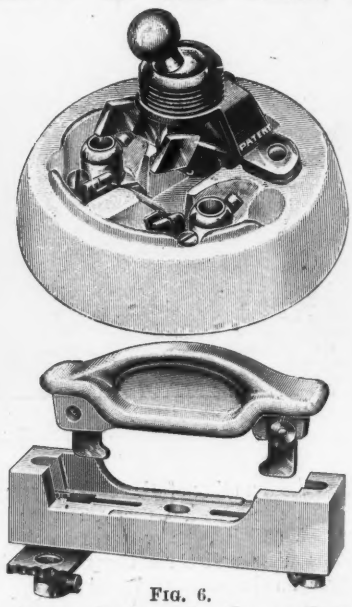


Fig. 6.
Tucker Tumbler Switch and Fuse.

the manufacture of which rigid inspection is an essential feature.

The work of the accessories department, where fuses, small switches, &c., are made, is carried on at the opposite side of the building, these items being assembled in the gallery on that side. Amongst the items there dealt with

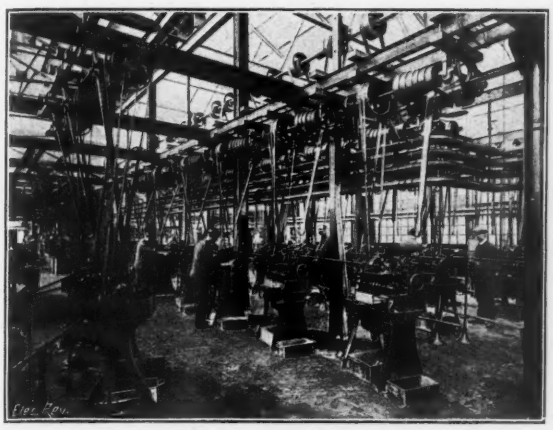


Fig. 7.—Automatic Machines.

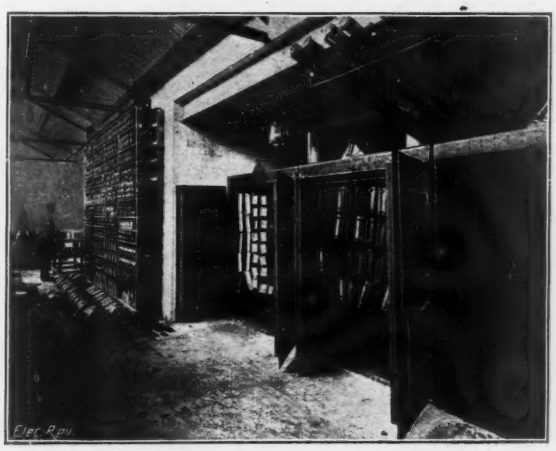


Fig. 8.—Stove Enamelling Room.

are neat little ironclad service fuse boxes, fuse boards, fuse clips, and ironclad watertight turn switches. A special range of fuse clips and sockets has been designed to meet the H.O. regulations, all metal parts being sunk into or enclosed in porcelain, so that accidental contact with any live metal is practically impossible. Larger switches and fuses are made in the switch shop, which occupies a considerable proportion of the building, and for part of its length adjoins the machine shop, where the cast-iron cases are handled. For the latter purpose comparatively heavy machine tools, multi-spindle drills, &c., are provided, and the work is done with jigs, which are designed with a special eye to economy in production—using the same drills for different holes, and so on, as far as possible. Milling machines are installed for switch and fuse parts, and capstan lathes.

One of the most interesting departments is that where the metal parts are finished; it is the pride of this department that any known finish can be reproduced here, and that the company employs a greater variety of finishes than any other firm in Birmingham. Fourteen standard plating finishes are used, but these are subject to innumerable variations; and, in addition to the familiar steel bronze and black finishes, we noted in particular old and rusty iron, mildewed green, and American royal copper—all on brass domes. Cable lugs are here electroplated with tin, to produce a thin and uniform coating without the defects that result from dipping into molten tin. The plating vats are heated with steam; the dipping vats are provided with hoods and a large fan which draws off the fumes; and the polishing shop, which is clean and airy, is provided with downward ventilating ducts which carry the dust to a cyclone separator.

Adjoining the annealing house is a new shop containing a range of ovens for stove-enamelling all cast-iron parts; the ovens are heated with hot water at a pressure of 500 lb. per sq. inch, and are kept at the different temperatures required to produce the best results with enamels of various colours. A special silicate enamel that the firm has evolved for the interior coating of switch, fuse, and iron cases generally is also applied in this department.

The cabinet-shop is well equipped with a variety of wood-

Fig. 9.—Press Shop; Office Gallery in Background.

working machines and holds a large stock of timber in course of seasoning. All french-polishing is done by hand.

Amongst the special features noted in a tour of the works, some of which have been mentioned above, were specimens of china switch domes tinted to resemble wood exactly, standardised boxes for switches and wall sockets, providing for interchangeability, and various handsome wall-plates, &c.

A complete modern system of booking is in force throughout the departments, and it is possible at any time to determine what work is in hand, the state of the stores of raw materials and finished goods, and the cost of production. An instance of the efficiency of the organisation was recently afforded when a rush order for 1,000 bell-pushes for the ss. *Aquitania* was received in the morning and the goods were dispatched the same evening, though the bulk of them had to be manufactured, specially coloured, *ab initio*. The motto of the firm is "Quality first," and no attempt is made to compete with goods that are cheap because they are flimsy.

Special facilities are provided for the staff to obtain their meals on the premises at a remarkably low tariff, and the social welfare of the staff is promoted by the firm in various ways

As indicated above, Mr. Tucker himself directs the affairs of the company. Mr. T. R. Martin is the commercial manager, and Mr. J. A. Crabtree chief of the technical staff; we are indebted to these gentlemen for many courtesies extended to us on the occasion of our recent visit to the works.

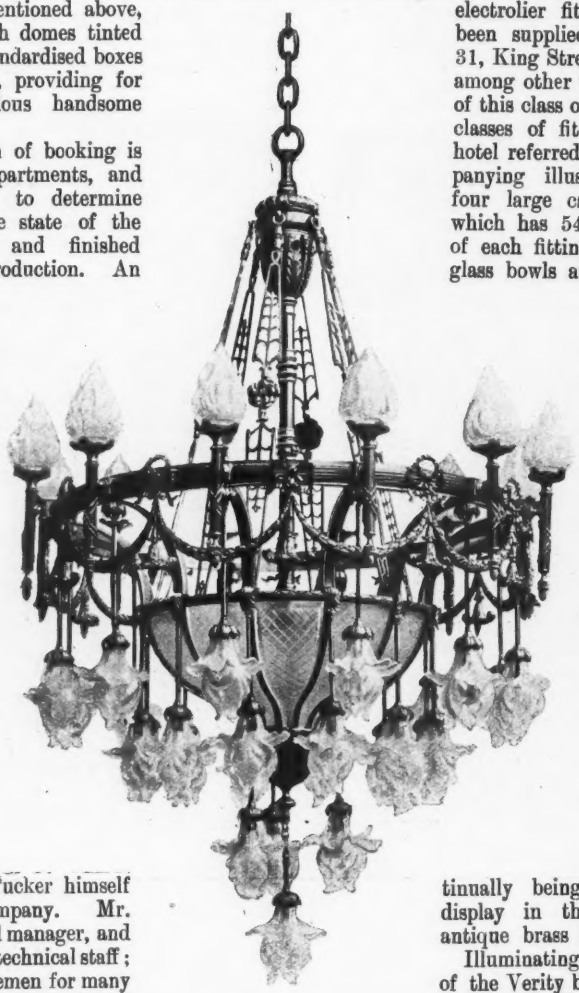


Fig. 1.
One of the Electroliers at the Piccadilly Hotel.

HOTEL LIGHTING FITTINGS.

For the lighting of the Piccadilly Hotel a number of special electrolier fittings and ceiling lights have been supplied by Messrs. Veritys, Ltd., of 31, King Street, Covent Garden, W.C., who, among other things, are making a speciality of this class of work. Two of the principal classes of fittings installed by them for the hotel referred to are shown in the accompanying illustrations. Fig. 1 is one of four large cast-brass electroliers, each of which has 54 lights. The total diameter of each fitting is 6 ft. Semi-indirect cut-glass bowls are fitted in the centre, made up of specially bent panels and fitted with dust covers to retain efficiency. Fig. 2 is an example of 60 cast-brass ceiling lights which were also supplied, fitted with semi-indirect cut-glass bowls. The bowls were finished in a manner so as to avoid glare, and at the same time to retain the brilliancy of the cuttings. We understand that the lighting of the hotel has been described as a perfect example of modern hotel illumination.

Messrs. Veritys, Ltd., have sent us some advance proofs of new bracket fittings that will be included in their big fixture list which makes its appearance in the autumn. New models are continually being produced and placed on display in the showroom. A specimen antique brass bracket is shown in fig. 3.

Illuminating fittings have been a feature of the Verity business ever since it had its beginning, between ninety and a hundred years ago. Gas fittings were, of course, for many years one of its leading features, but for the last thirty years at least, specialised knowledge and skill have been brought to bear upon fittings for electrical illumination — a department affording infinitely greater scope in the production of beautiful designs and artistic effects.

Fig. 2.—A Ceiling Light at the Piccadilly Hotel.

Fig. 3.—An Antique Bracket.

During the present Convention of the Incorporated Municipal Electrical Association at Birmingham, probably not a few of the members will take advantage of the opportunity to visit these works, and the company has made arrangements to facilitate the journey, at the end of which a hearty welcome may be confidently anticipated.

Since
a cop
for In
of th
city d
referr
It
techni
aggrie
appoi
varian
to the
to the
opinio
it in
of imr
one ca
how m
ditions
Depart
We
engine
any eff
Commi
their s
the *esp*
them t
determ
seek to
Thes
duty, w
set, a g
that vi
supply
mean va
The
the only
heart, n
the L.G
of poun
will han
without
the cons
It wil
keep our

No. 29,
Du
Sir,—I
forward,
enclosed
members
and other
appointme
electricity
It appe
neer, that
the appoi
in-charge
consumers
official re
both the
stated tha
highly-tra
duties in
and Mr. R
of promot
qualified a
to Mr. Elw
however, w
At a su
Ruddle rep
position, a
Corporation
be perform
following
W. Nolan
recommend
Muntz, an
recommend
by the Corp

A QUESTION OF STATUS.

SINCE our last issue appeared, we have been favoured with a copy of a letter written by the Local Government Board for Ireland to the parties chiefly concerned in the matter of the appointment of an assistant engineer to the electricity department of the Corporation of Dublin, to which we referred in our leading article last week.

It appears that the majority of the members of the technical staff of the department, feeling themselves aggrieved at the action of the Committee in making an appointment over the heads of many of them, entirely at variance with the advice of their chief, sent a memorial to the L.G.B., which replied that it had addressed a letter to the Corporation on the subject. That letter is, in our opinion, so important that we make no apology for printing it in full. It is true that the contents of the letter are of immediate interest only to our Dublin friends, but no one can read the last portion of it without seeing at once how municipal offenders may be attacked under certain conditions with the aid of the heavy ordnance of a State Department.

We do not gather that Mr. Ruddle, the city electrical engineer, or Mr. J. L. Kettle, his chief assistant, has made any effective protest against the indefensible action of the Committee in ignoring their advice, but the members of their staff have shown the right spirit, and we hope that the *esprit de corps* which they have displayed will bring them the result which rarely fails to crown the loyal, determined, and continued efforts of a body of men who seek to redress a gross injustice.

These men should be cheered in the performance of a duty, which we must not forget involves, at least at the outset, a good deal of danger to the individual, by the reflection that victory will provide for the staffs of all the municipal supply stations throughout the kingdom a precedent of no mean value.

The L.G.B. in this case threatens the Corporation with the only weapon which seems to strike any terror into its heart, namely, the golden rod, and it delights us to see that the L.G.B. is prepared to hold up a loan of many thousands of pounds until it is satisfied that the technical staff which will handle the new apparatus is properly qualified to do so without disaster to the undertaking and inconvenience to the consumers.

It will be interesting to see what happens, and we will keep our readers informed.

[COPY.]

Local Government Board, Dublin,
June 11th, 1914.

No. 29,045/1914.

Dublin County Borough.

Sir,—I am directed by the Local Government Board for Ireland to forward, for the consideration of the Dublin Corporation, the enclosed memorial which the Board have received, signed by 20 members of the technical staff of the electricity supply department, and other documents relating thereto, with regard to the recent appointment of an assistant engineer in connection with the electricity supply.

It appears from the report of Mr. Ruddle, city electrical engineer, that, owing to the large increase in the work, he recommended the appointment of an assistant to Mr. H. L. Elward, the engineer-in-charge of the important work of testing and connecting up all consumers' installations, and of seeing that all technical and official regulations are complied with for the protection of both the Corporation and the consumer. Mr. Ruddle, it seems, stated that the assistance to Mr. Elward could only be given by a highly-trained electrical engineer capable of carrying out the full duties in one district while Mr. Elward was engaged in another, and Mr. Ruddle recommended that, in furtherance of the principle of promotion, Mr. McKeown, as senior on the list of engineers qualified and available, should be regularly appointed as assistant to Mr. Elward, without increase of salary. This recommendation, however, was not accepted by the Committee.

At a subsequent meeting of the Committee, it seems that Mr. Ruddle reported that he had received 10 applications for the position, and he recommended that in the best interests of the Corporation, and having regard to the importance of the duties to be performed, the appointment should be made from one of the following four engineers, namely, Messrs. C. McKeown, J. Harding, W. Nolan and W. Downey. The Committee, however, ignored the recommendation of their expert adviser and recommended Mr. B. Muntz, an installation wiring inspector, for the post, and this recommendation of the Committee appears to have been adopted by the Corporation.

Mr. Muntz, it is alleged, has had only four years' experience in the employment of the Corporation, and would not seem from Mr. Ruddle's report to be properly qualified to take full charge of the electricity supply works.

The Board have under consideration an application from the Corporation for a large loan for the extension of the electricity works, and it is incumbent on them to be satisfied regarding the proper management of these works. They further desire to call the attention of the Corporation to the danger which may arise in placing any important electric work in charge of a man with insufficient experience and qualifications as it is obvious that any mismanagement might lead to serious accidents and to inconvenience to the public.

The Board, therefore, suggest that the Corporation should be guided by the advice of their responsible engineer, and appoint an assistant engineer possessing the necessary technical experience.

The documents sent with this letter should be returned to this department with the reply of the Corporation.

I am, Sir,
Your obedient Servant,
A. R. BARLAS, *Secretary*.

The Town Clerk,
City Hall, Dublin.

OPENING FOR ELECTRICAL GOODS IN THE LEVANT.

M. GIRAUD, President of the French Chamber of Commerce at Constantinople, gives, in a recent issue of the Chamber's *Bulletin*, a useful article on the outlet for electrical goods in the Levant. Ottoman statistics, he states, do not discriminate imports relating to electricity. Moreover, the latest publication deals only with the statistical year 1910-11, since when electricity has made huge progress in Turkey. It is now in course of being definitely installed in Constantinople. As a matter of fact, this metropolis will shortly be endowed with an important network of electric tramways; four principal lines are already working—the Tunnel to Chichli line, the Tunnel to Tatavla, Carakeuy to Bechtitache, and Carakeuy to Emin Eunu—and others are being rapidly got out of hand. The public have accorded an emphatic welcome to these lines of tramway, which are built of first-class material and work well. The greater number of the motor-cars have two trailers. The electric light will shortly be installed in the city; the mains are laid already. This will rejoice the inhabitants of Pera, whom the gasworks at Dolma-Bagtché now force to live in perennial darkness. Lastly, the telephone is being placed at the disposal of the public. Electricity is thus about to make its official entry into Constantinople to the lively satisfaction of those who inhabit the city. We may say, however, that it is not altogether a novel institution. Electric bells are installed almost everywhere; private electric plants have furnished the electric light to a certain number of houses; State departments are connected up by telephone, which is likewise installed in many business establishments and even in private houses. But what was only the exception is now to become general. It is probable that the greater number of the electric generating plants belonging to private individuals will stop working when the municipal service starts. Electric lifts and cranes will likewise be served with current from the public supply, also the motors used in small trades, now driven by petrol, &c. Taking in detail the applications of electricity in the city, electric bells, as previously said, are found everywhere in Constantinople and even in the provinces. The major part of the wires comes from Germany, although those from France are of better quality. Similarly, the indicator boards are imported from Germany. Of the whole of these items, Germany, we are informed, supplies 70 per cent., 20 per cent. only falling to France and 10 per cent. to Belgium. A German bell can be obtained for 12 p., or 2·50 fr.; a French bell costs double. The cheap bells are set up by stove makers who have no notion of electricity. These installations are always getting out of order, and continually need repairing.

As previously stated, since the granting of the Constitution many telephones have been set up; this is also the case in the provinces. Those most in use, on account of their low price, are German; in the provinces they are all German. As a result of the creation of the Société Ottomane des Téléphones, there has been a stoppage of private installations. In the supply of telephone wire and cable the French are fairly active, some seven French firms participating.

The Société Ottomane des Téléphones is, as regards its capital, Anglo-Franco-American. It has imported its cable from England, and its equipment from Belgium. Its manager is an Englishman. The several electric lighting installations which have been in existence for some time at Constantinople, namely, those at the Banque Ottomane and the Department de la Dette Publique, are French, and were supplied—the former by the Société d'Eclairage Electrique, of Paris, and the latter by the firm of Sautter, Harlé et Cie., also of Paris; they have given excellent results. Later, Messieurs L. Faure et Cie. installed the electric light in several establishments. But in more recent times all the big German firms have opened agencies in the city; with the commercial agent is located a technical expert, which practice facilitates business. They also accord very great facilities for payment and their prices are low. A Hungarian company likewise opened a branch, and an Italian firm followed suit, with strong support from an Italian bank. La Société Ottomane d'Electricité entrusted with the public electric

lighting, opened a branch to carry out private installations, and, lastly, all the chief workmen, trained by the various firms mentioned above, formed themselves into a company and offered to carry out small installations. Competition in consequence became very keen, and French firms remained for a certain period almost at a standstill. Lately a turn in the tide has set in. The Société Ottomane d'Electricité, recognising the difficulties attending on private work, and the consequent vexations, have closed their private installation branch. The other big firms, become wiser by experience, have raised their prices and become more cautious. The very small contractors have succumbed to the exigencies of credit, and retaken positions with their old employers. French firms are now, therefore, encountering a more reasonable competition.

ELECTRICAL TERMS AND DEFINITIONS.

(*Continued from page* 969.)

The following are new definitions:—

R.M.S.—Abbreviation for root-mean-square.

Rail, Live, Third, Fourth.—See Conductor Rail.

Rated Load or Output (of generators and motors).—The output which generators or motors are intended to produce under specified conditions.

Rating of generators, motors, accumulators, etc.—The designation of the proposed output under the specified conditions, such as continuous working or intermittent working.

Ratio of Transformer, Ratio of Transformation.—The number obtained by dividing the primary volts or amperes by the secondary volts or amperes in voltage and in current transformers respectively. The number is not quite constant, and depends to some extent on the conditions.

Reactance.—That component of impedance which is not caused by resistance.

Reactive Current.—The component of the current in quadrature with the voltage.

Reactive Power.—In an alternating-current circuit, the product obtained by multiplying the volt-amperes into the sine of the angle of phase-difference between the current and the potential difference.

Reactive Voltage.—The product of reactance and current.

Receiver, Telephone.—That part of the telephone apparatus which reproduces the sounds.

Recorder.—Any apparatus which makes a permanent record.

Rectifier.—An apparatus which converts an alternating current into a unidirectional current.

Rectify, To.—To convert an alternating current into a unidirectional current approaching more or less to a continuous current.

Regulation (*a*) of a generator.—The variation (up or down) of pressure between no load and full load under specified conditions. *Special meaning*: The percentage rise in pressure when full load is removed from a generator, the speed and excitation being kept constant. (*b*) of a motor.—The variation (up or down) of the speed between no load and full load under specified conditions, usually constant supply voltage. (*c*) Telegraph and overhead wire-work.—The equidistance of wires on a span.

Relay.—An apparatus for opening or closing a circuit, controlled by the current in another circuit.

Reluctance.—*See* Magnetic Reluctance.

Reluctivity.—*See* Magnetic Reluctivity.

Remanence.—*See* Magnetic Remanence.

Remote Control.—The controlling of apparatus and plant from a distance, *e.g.* the operation of the main switches from a switchboard at a distance from them.

Residual Magnetism.—The magnetism remaining after the magnetizing force has been removed.

Resistance.—(*a*) That property of a substance or body which causes in it a dissipation of electrical energy as heat when a current flows through it. (*b*) The resistance of a conductor is the quotient of the potential difference between the terminals of the conductor by the current, usually expressed in ohms.

Resistance, Magnetic.—*See* Magnetic Reluctance.

Resistance, Specific.—*See* Resistivity.

Resistivity.—The resistivity (specific resistance) of a substance is the reciprocal of the Conductivity.

Resonance.—A circuit is said to be in resonance when the oscillations produced in it have the frequency of the natural oscillations in the circuit.

Retentivity.—A synonym for Coercive Force.

Return Feeder.—In electric traction. The conductor conveying electric current from the rails to sub-stations or to the generating station.

Reverse Current Breaker.—A circuit breaker which is opened automatically when the direction of the current is reversed.

Reverse Current Relay.—A relay which is only operated by a current in one direction.

Rheostat.—A readily adjustable resistance.

Rotary Converter.—*See* Converter.

Rotor.—That part of an alternating-current generator or motor, whether armature or field magnet, which rotates.

(*To be continued.*)

NOTES.

Apparatus Needed for Woking Technical Institute.—A few weeks ago we referred to the opening that existed for some of our manufacturers generously to assist in furnishing certain electrical and engineering equipment required for the new school and institute at Woking. We are pleased to say that offers have been received from several firms, and, for the information of those who may be still thinking the matter over, we print below full particulars of the apparatus and articles that they are invited to contribute:—

Physics Laboratory.—*Apparatus for Electricity and Magnetism.—Electricity, Frictional:* 12 thick glass rods, 12 in.; 12 ebonite rods, 12 in.; 12 rods of sealing-wax; 12 electroscopes, 1 leaf, students' size; 4 electrophoruses; 2 Leyden jars, movable coatings; 2 each spherical, cylindrical, pear-shaped conductors of wood, covered with tin-foil, on insulated foot; 1 Wimshurst machine, simple form, 24-in. plates; 1 Franklin pane; 1 air condenser; 1 pair discharging tongs; 1 set of Faraday ice-pails; 2 Leyden jars, pint size; 1 brass sphere with hole for proof plane; 1 doz. each flannel and silk rubbers; 1 electric whirl; 1 insulating stool.

Electricity, Voltaic: 1 each Daniell, Grove and Bunsen cells; 6 Leclanché cells, 2 pints; 12 copper plates for simple cells; 12 zinc plates for ditto; 1 each bichromate cell, 2-pint size, 1-pint size; 2 secondary batteries, each 3 cells. *Instruments:* 1 tangent galvanometer; 2 D'Arsonval galvanometers; 1 ballistic galvanometer; 4 resistance boxes, 1-50 ohms; 2 Post Office bridges, students' form; 4 metre bridges; 6 two-way switches; 6 single-tapping keys; 2 double-tapping keys; 2 Ruhmkorff commutators; 24 terminals, 1½ in.; 24 binding screws, connectors 1 in.; 1 electromagnet, 8 in. long, 1 in. core; 2 induction coils; 1 students' motor; 1 students' dynamo; 2 apparatus for determining J electrically; 1 Oersted apparatus; 3 deflecting galvanometers, scales and stands; 1 voltmeter, 0-10 volts; 1 ammeter, 0-10 amperes; 1 adjustable rheostat; insulated copper wire.

Magnetism: 6 pairs bar magnets, 10 in.; 6 pairs ditto, 5 in.; 6 pairs horse-shoe magnets, 10 in.; 6 pairs ditto, 5 in.; 12 exploring magnets; 12 compass needles and stands; 2 deflection magnetometers; 2 vibration magnetometers; 1 dipping needle; 24 steel knitting needles; 24 soft iron rods.

List of Wireless Apparatus.—Alternating Current: Main switch; manipulative key; magneto key; variable inductance, low frequency; transformer; condenser; air choke; jigger; spark gap; variable inductance, high frequency; aerial inductance; arrester spark-gap; multiple tuner; magnetic detector; telephones; buzzer; leads to aerial.

Direct Current: Starter and field regulator for transformer (rotary); main switch; buzzer.

The Power Consumption of Electric Lighting Dynamos and Engine Starters.—The question has frequently been raised as to the amount of power consumed in the running of a car electric lighting dynamo and engine starter. With the object of settling the point so far as its own particular set is concerned, one American maker of such equipments—the United States Lighting and Heating Co., of Niagara Falls, N.Y.—whose U.S.L. set is combined in a single unit, recently carried out an interesting test with a car fitted with the arrangement. Four runs were made in each direction, that is, one each way with the motor-generator at work, and the others with the apparatus out of gear; an average speed of 25 miles per hour was maintained during the four runs, so that the conditions throughout should be equal. It was found that when the generator was delivering its maximum output the car ran a distance of 11·85 miles to the gallon, while with the generator out of commission the distance covered was 12·3 miles, or 3·8 per cent. farther. A little calculation with these figures will show that it took 0·08 gallon per hour to operate the motor-generator, or, in other words, that the machine will deliver its maximum power for 12½ hours on one gallon of spirit. At 25 M.P.H., the car will travel 312½ miles in 12½ hours, so that, taking petrol at 1s. 9d. per gallon, the extra cost of spirit owing to the installation of the motor-generator is about 4d. per 100 miles, which is not a high figure considering the convenience of electric starting and lighting. It is, however, asserted that instead of using more petrol, it is more than probable that the installation of the motor-generator effects an economy in petrol consumption, owing to the fact that the easy starting allows the motorist to stop his engine when the car is stopped for only a few minutes, instead of, as in the ordinary course, keeping it running. This saves idle consumption of petrol which, in some cases, may amount to more than the extra quantity required because of the presence of the motor-generator.

The Leeds Strike.—An inquest on the body of William Culloden (42), of 58, Holborn Street, Woodhouse, Leeds, an inspector in the Leeds Corporation electricity department, was held at Kirkstall last week. It was stated that the deceased's body was found in the Leeds and Liverpool Canal near Newlay on the previous Sunday. During the recent municipal strike Culloden had remained loyal to the Corporation. The result was that he was called a "blackleg," and shortly after the dispute he was attacked by two men and kicked under the chin because he had remained at work whilst the others were on strike. These incidents had made him depressed, and his worry had been accentuated by one or two small home affairs. The jury returned a verdict of "Suicide through temporary insanity."

Seasoning Timber Electrically.—In the Melbourne *Age* of May 5th, a report was given of evidence before a sitting of the Commonwealth Powellising Commission.

Mr. F. A. Alcock, managing director of Alcock Proprietary, Ltd., billiard table manufacturers, stated that his firm needed a good deal of timber which required seasoning before it could be used. During the past five years they had employed a special process of seasoning by means of electricity. An electric current was passed through the timber, the sap acting as the conductor. The period of treatment depended upon the length and thickness of the wood. Timber 12 ft. long × 1 ft. wide could be seasoned in about eight hours, but it had to be stacked for four or five months after treatment in order to dry up all the moisture which remained. Formerly, however, when the seasoning was done naturally, they had to stack the timber for four or five years before it was fit for use. The results of the electrical process had been very satisfactory, and the losses from warping were much less than when they employed the natural method of seasoning. His firm had had a parcel of timber tested by the Powellising process, and the result was not satisfactory. The process seemed to have been too severe on the timber, and some of the wood split.

In reply to questions by members of the commission, he said his firm had experienced difficulty in getting a sufficient supply of blackwood. By means of their electrical process, however, supplies were made more quickly available.

Mr. T. J. Lawson, foreman in the employ of Alcock Proprietary, Ltd., said that natural seasoning took quite five years, and the loss of timber through warping and other sources was quite 25 per cent. After timber had been treated by the electrical process, he did not think the loss was 10 per cent. He considered that the process could be used on a large scale and that logs could be treated. It was only a question of power. The greener the timber the better the results. They had used the special process principally on blackwood, but mountain ash had also been treated successfully.

Mr. Alcock, recalled, stated that he did not think it would be a difficult matter to force a preservative, such as sulphate of zinc, into timber immediately after the sap had been removed by the electrical process.

Water-Power Congress.—A second White Coal (houille blanche) Congress is to be held at Paris on September 6th. This Congress, in which, it is said, a number of prominent foreign scientists and engineers will participate, will study a variety of important matters. M. Léon Michoud, professor of the faculty of law at Grenoble, will set out the legislation relating to "white coal" in the principal countries of the world. The legislation affecting hydroelectric stations, as regards State-owned water courses, will be treated of by M. Paul Bougault, of Lyons. M. Pillet, professor of the faculty of law at Paris, will study the legislation of hydroelectric stations as regards non-navigable water courses; and, lastly, M. Balleydier, dean of the faculty of law at Grenoble, will handle the subject of riverain rights, and especially the law as to the flow of water.

Water-power Society in Sweden.—From the annual report of the Svenska Vattenkraftforeningen (Swedish Water-power Society), we learn that that body now comprises 226 members, an increase of seven during the past 12 months. The Swedish Timber Export Association, the Swedish Wood Pulp Association, the Swedish Paper Manufacturers' Association and the Jernkontoret are represented on the board of the Society, which has recently published a number of brochures on the water-power, waterfalls, &c., of Sweden.

Terrestrial Magnetism.—The report of the Astronomer Royal for the past year states that the new instruments for recording the variations in the magnetic elements are to be housed in a new building in the Park, in which the temperature will be maintained constant by electric heaters and a thermostat. The mean values of the magnetic elements for the past four years were as follows:—

Year.	Declination W.	Horizontal force in c.g.s. units.	Dip (8-in. needles).
1910 ...	15° 41·2′	0·18532	66° 52′ 37″
1911 ...	15° 33·0′	0·18529	66° 52′ 6″
1912 ...	15° 24·3′	0·18528	66° 51′ 46″
1913 ...	15° 15·2′	0·18514	66° 50′ 27″

Time signals are regularly received from the Eiffel Tower and Norddeich; they are slightly late on G.M.T.—generally 0·04 to 0·05 second in the case of the former, and about 0·06 in the case of Norddeich.

Diesel Engine Users' Association.—The next meeting of this Association will be held at 4 p.m. on Wednesday, July 8th, at the Institution of Electrical Engineers, Victoria Embankment, W.C. There will be no meeting of the Association in August.

Copper.—Returns for the end of May, as shown on Messrs. H. R. Merton & Co.'s tables, give a further increase in European visible supplies, which rose during the month from 29 278 tons to 32,370. Of this increase, England had 1,165 tons, and France 3,624, there being a decrease in German and Dutch stocks, and the quantity afloat from Chile. Supplies for the month were high from North America, and below average from Spain and Portugal to this country. Chile shipments were slightly above average, and Australian well above. Total supplies were strong at 51,447 tons, well exceeding deliveries. American stocks at the end of April exceeded those at the end of March by 2,558 tons. The world's supplies at the end of April were 60,679 tons, an increase of 5,707 tons over the quantity for the end of March.

Educational Notes.—BIRMINGHAM UNIVERSITY.—Sir George Kenrick has offered to endow a chair of physics in memory of the late Prof. Poynting, at a cost of £18,000, and the Council has gratefully accepted the gift. Sir George has already given £20,000 to the University.

MANCHESTER MUNICIPAL SCHOOL OF TECHNOLOGY.—An internal combustion engine laboratory is to be provided, at a cost of £21,000; leading manufacturers have undertaken to lend examples of their latest types of engines.

Electricity in Farming.—Everything in a new pig-sty outside Randers, Denmark, which has two storeys, and accommodates 1,500 animals, is worked by electricity. There are railway lines all over the sty, and only three men are needed to do the work, which includes grinding corn and fetching milk, food-stuffs, and young pigs from Randers.

Storms in London and Paris.—On Sunday last a violent thunderstorm raged over South London for four hours, with frequent lightning discharges and heavy rain and hail. On Wandsworth Common four adults and three children were killed by lightning whilst sheltering under trees, and many persons were injured more or less severely. Many buildings were struck and damaged, and a house near Folkestone was burnt down. The L.C.C. conduit tramways were stopped by floods in Tooting and Norbury, and the District Railway traffic was blocked for two hours on the Wimbledon branch owing to the bursting of a sewer, which flooded the line to a depth of nearly 4 ft. The tramway service between Croydon and the Crystal Palace was also held up for some time. Fire alarms were set ringing in various places by the storm. The telephone service with Paris was temporarily interrupted.

On Monday a similar storm, of great violence, burst over Paris, and many lives were lost. The Underground Railway was flooded, and traffic was disorganised; the construction works of the Metropolitan Railway were also flooded, and fell in in several places, leaving yawning gaps in the streets, in which a number of vehicles and passengers were entombed. Electric light and telephone services were dislocated.

The following letter on this subject arrived too late for our "Correspondence" columns:—

"The sad fatalities which occurred during the thunderstorm on the 14th inst. cause one to reflect as to the best thing to do when caught in the open country by such a storm. I have read, and I am inclined to believe, that the safest course is to get one's clothing thoroughly drenched and to lie flat on the ground; the process is, however, so unattractive that few people would ever adopt it. To shelter under trees is obviously hazardous, the neighbourhood of the trunk being the most dangerous position. The question occurs whether relative safety might not be secured by climbing up into the tree and so obtaining the shelter of the branches; should the tree be 'badly struck,' the result would probably be very serious, though not necessarily fatal, as it would certainly be if the person were standing under it. I am inclined to think that comparative safety would be secured by climbing into the tree. The expression of opinion of some of your readers on this point would be of interest. "CHAS. A. BAKER.

"*June 16th*, 1914."

Provided that one climbed out on a branch to some distance from the trunk, Mr. Baker's suggestion might be adopted with success; but even a slight shock such as might result from induction, or the mental shock due to the tree being struck, might cause a fall as fatal as the lightning flash.

Many years ago we published a table prepared by the Dutch Meteorological Institution showing the frequency with which different trees were struck; this was printed in "Modern Lightning Conductors," by Mr. Killingworth Hedges, in 1905, and we reproduce it below:—

Poplar, 232	Pear, 25	Chestnut, 5
Oak, 130	Ash (?), 18	Apple, 5
Willow, 70	Lime, 14	Cherry, 4
Yew, 50	Walnut, 8	Alder, 4
Fir, 27	Beech, 5	Birch, 2

These data should be heavily discounted to allow for the prevalence of one or other tree in the district examined, as to which we have no information; fruit trees, for instance, are scarce compared with oaks and poplars. However, in an inquiry carried out by the German Government in 1899 over an area of 50,000 acres, some useful figures were obtained, which we reproduce from the same source:—

	Prevalence.	Frequency of striking.	Susceptibility.
Oak... ...	11 per cent.	58 per cent.	46
Fir	6 "	21 "	31
Beech ...	70 "	8 "	1
Pine ...	13 "	7 "	5
Other ...		6 "	—

The figures in the fourth column, which we have added, indicate roughly the relative susceptibility to lightning strokes of the different kinds of tree, based upon the data given in the second and third columns, but disregarding the "other" trees of which the prevalence is not stated. It will be seen that the beech and pine are rarely struck. It is noteworthy that the elm does not appear in either set of data.

Marconi v. Helsby Wireless Telegraph Co.—Mr. Justice Eve agreed on Tuesday that the hearing of this case should not be taken before June 23rd.

Inquiry.—Makers of the "Halliwell" electric hair dryer are asked for.

Cheap Electricity in British Columbia.—In the course of an article in the *Austin Advocate*, descriptive of a trans-Canadian motor trip, the author states that in passing through Hedley, a gold-mining town in British Columbia, late one night, he came upon a peculiar circumstance:—"All the shops in the main street, and most of the houses, had the electric light brightly burning. It looked very weird somehow, just as if the people had suddenly deserted the town. From the watchman at the mine, I learnt that the electric current was so cheap that people never bothered to turn it off!"

Appointments Vacant.—Switchboard attendant for Erith (20s. to 25s.); armature winder, age 26, for East Indian Railway (200 rupees per month); overhead mains working foreman (£2 2s.) for Neath R.D.C.; stores clerk (£78) for Bexley U.D.C.; visiting teacher of electric wiring for two evenings a week, assistant visiting teacher in electrical engineering for two evenings a week, and visiting teacher in electrical engineering, D.C. and A.C., for three evenings a week, at Hackney Institute; assistant visiting teacher in electrical instrument making, at Shoreditch Technical Institute, four evenings a week, for the L.C.C.; jointer, chief assistant and mains engineer (£160), for Rhondda U.D.C. Electricity Department. See "Official Notices" to-day.

Panama-Pacific International Exposition, 1915.—The arrangements for the International Electrical Congress to be held next year at San Francisco are far advanced, and a great success is confidently anticipated. The proceedings will be published in 13 volumes, and it is expected that 7,500 members will be present, including at least 1,200 delegates. The I.E.C. meets during the week beginning September 6th, and the Congress in the next week; the International Engineering and Gas Congresses will meet in the two weeks following. Members who belong to some engineering or scientific body of recognised standing will be entitled to attend the Congress, and to receive any four of the volumes, together with the general index, for the membership fee of $5.

The allotment of space in the Machinery Section of the Exposition, which was over-applied for, has been practically completed, and it is stated that the exhibits will make the finest collection of electrical and other machinery ever assembled under one roof. The erection of foundations for machines has already commenced. The Exposition opens on February 20th, and remains open till December 4th, 1915.

Parliamentary.—BRENTFORD GAS BILL.—The Court of Referees has declined to allow the Metropolitan Electric Power Co. a *locus* against part of the Brentford Gas Bill. Amongst the powers sought by the Gas Co. are authority to make applications for electric lighting orders and to acquire by agreement undertakings already possessing such powers.

ELECTRIC LIGHTING ORDERS.—The Hinckley U.D.C. has deposited a petition against the Hinckley and District Electric Lighting Order; and the Lurgan Light and Chemical Co. against the Lurgan Order.

In the House of Commons on June 9th, the London County Council (Tramways and Improvements) Bill was read a third time.

In the House of Commons on Tuesday, the Shropshire, Worcestershire and Staffordshire Electric Power Bill was read a second time.

In the House of Lords on Tuesday, the London Electric Railway Bill and the Central London Railway Bill were read a third time.

Institution and Lecture Notes.—INSTITUTION OF CIVIL ENGINEERS.—The annual conversazione will be held at the Institution on Thursday, July 2nd, from 8.30 to 11.30 p.m.

INSTITUTE OF METALS.—The autumn Conference of the Institute will be held at Portsmouth on September 10th and 11th, in the Municipal College, a number of important papers being read each morning.

The annual meeting of the Union of Austrian and Hungarian Electric Lighting Undertakings was held in Cracow from the 7th to the 11th inst. Among the papers read was one by Dr. Lederer on "New Departures in the Field of Electric Lighting," and one by Herr W. von Winkler, of Klagenfurt, on "The Working of Hydro-Electric Stations under Snow and Ice Conditions."

THE GERMAN ELECTROTECHNICAL SOCIETY.—The annual meeting of the Verband Deutscher Elektrotechniker has just been held in Magdeburg, under the presidency of Herr D. W. Christiani, of Freiburg. The proceedings extended over three days, during which time the various Committees of the Society submitted reports, among the subjects dealt with being the Standardisation of Insulated High-Tension Conductors, Standard Tests for Iron and Steel Plates, and Proposals for Uniform Tests of Installation Material. A number of papers were also read, these including one by Dr. Fritz Forster, of Dresden, on "Electro-Chemistry and Thermo-Electricity in the Metallurgical and Chemical Industries"; one by Prof. Dr. Diesselhorst, of Brunswick, on "Progress in Wireless Telegraphy"; one by Dr. Guggenheim, of Berlin, on "Electric Steel"; one by Prof. E. Josse, of Berlin, on "Condenser Installations"; and one by Herr O. Krell, of Berlin, on "Electricity on Board Ship." As a mark of appreciation of his work in connection with electrical engineering, Dr. Ing. Rathenau was elected an honorary member of the Society, which has now no fewer than 6,011 members. Dr. G. Klingenberg, of Berlin, was elected President of the Society for the current year, and it was resolved that the next annual meeting should be held in Strassburg.

OUR PERSONAL COLUMN.

The Editors invite electrical engineers, whether connected with the technical or the commercial side of the profession and industry, also electric tramway and railway officials, to keep readers of the ELECTRICAL REVIEW *posted as to their movements.*

Central Station Officials.—MR. H. LOVE, fourth engineer in charge of the Hammersmith B.C. electricity undertaking, has resigned his appointment, having obtained a similar position with the Shoreditch B.C. It is proposed that in the meantime engine-driver J. E. Pearce, who has been in the service of the Council since 1903, and whose wages at present are 47s. 6d. per week, should be promoted temporarily on trial to the vacant position at the commencing salary assigned thereto—£130 per annum.

The Lowestoft T.C. has increased the salary of MR. H. HOBLEY, first assistant engineer at the electricity works, to £156 per annum.

The King's Lynn T.C. has granted the engineer at the electricity works (MR. JACKSON) a bonus of £40 in respect of extra work in connection with departmental extensions during the past 18 months.

The Wakefield City Council has decided to increase the salary of the electrical engineer (MR. NEVILL) from £400 to £450 per annum.

MR. EDWARD E. HAMAR, late shift engineer at the Frindsbury power house of the Kent Electric Power Co., has been presented with a silver rose-bowl by the power house and office staff, on the occasion of his leaving to take up a similar appointment at the Smethwick power house of the Birmingham and Midland Tramways Joint Committee.

Whitby U.D.C. has increased the salary of MR. J. W. PIGGOTT, electrical engineer, to £150 per annum.

Tramway Officials.—MR. WILLIAM POOLE, formerly with the N.S.W. Government Railways and Tramways Department and the Adelaide Tramways Trust, has been appointed assistant electrical engineer to the South Australian Government Railways.

General.—At Clarborough Church, on June 11th, the marriage took place of MR. J. T. GLENDINNING, chief electrical engineer at Wiseton Hall, and Miss E. Brown, daughter of the late Mr. Geo. Brown. Over 100 presents were received.

The marriage took place at Kirkby Stephen on June 11th of MR. MATTHEW HOMLER, manager of the North-Eastern Railway Co.'s E.L. plant at Kirkby Stephen, and Miss May Elizabeth Kilner.

MR. ERIC BERGSTROM, a Swedish engineer, who has practised in London for several years, has been appointed managing director of Ferrum, Ltd., Winchester House, Old Broad Street, London, E.C., specialists in the manufacture of steel tubes for hydro-electric stations, &c.

MR. H. J. GROVES WEBB has resigned his position as manager of the apparatus department of the Electrical Co., Ltd., with whom he has been connected for the last five years.

The Parliamentary and Electricity Committee of the Turton (Lancs.) D.C. has appointed MR. FREDERICK CHARLES SPRIGG as electrical engineer, from July 1st next.

Obituary.—MR. NORMAN WATT.—Our Johannesburg correspondent writes with reference to the death of this gentleman, already announced in our pages:—"A very sad accident occurred at the Brakpan Station of the Victoria Falls and Transvaal Power Co. on Saturday morning, May 23rd, resulting in the death of Mr. Norman L. Watt, the resident engineer in charge. About 9 a.m. Mr. Watt went to inspect a new compressor and was passing near a cast-iron compressed-air pipe, when the pipe burst, owing probably to a defect in the casting. Several fragments of pipe struck him in the face, and his skull was badly fractured. He was conveyed immediately to the Boksburg Hospital, but died without recovering consciousness. The deceased came out to this country from Falkirk in 1911, and was appointed shift engineer at the Simmer Pan Station. There he showed such ability and promise that he was appointed engineer in charge at Brakpan about 12 months ago. Mr. Watt, who was 35 years old, leaves a widow and one daughter. The funeral cortège left the Boksburg Hospital on Sunday afternoon, and was largely attended by representatives of the V.F.P. Co., among whom were Major the Hon. W. L. Bigot, the general manager, and Mr. Bernard Price, chief engineer."

NEW COMPANIES REGISTERED.

Electrical Finance and Securities Co., Ltd. (136,276).—Registered June 8th, by Barnett, Chadwick & Co., 8, Camomile Street, E.C. Capital, £50,000 in £1 shares. Objects: To invest in the securities of electrical, engineering, telephonic and telegraphic appliance, tramway, railway, power, light and similar companies, &c. The signatories are:—G. H. Nisbett, Huyton, Liverpool, electrical engineer, 1,000 shares; J. Taylor, Helsby, Warrington, manufacturer, 1,000 shares; D. Sinclair, Prescot, Lancs., manager, 1,000 shares; E. K. Muspratt, J.P., Seaforth Hall, near Liverpool, 1,000 shares; J. S. Harmood-Banner, 21, North John Street, Liverpool, chartered accountant, 1,000 shares; D. Bates, Huyton, Liverpool, electrical engineer, 500 shares; W. B. Cownie, 3 Laurence Pountney Hill, E.C., 500 shares. Minimum cash subscription, 1,000 shares. The first directors (to be not less than three or more than seven) are G. H. Nisbett, J. Taylor, and W. B. Cownie; qualification, £500; remuneration (exclusive of any managing director), £200 each per annum, and £50 extra for the chairman. Registered office, 3, Laurence Pountney Hill, E.C.

United States Railless Electric Traction Co., Ltd. (136,404).—This company was registered on June 13th, with a capital of £1,000 in £1 shares to carry on in the U.S.A. or elsewhere the business of an electric traction, light and power company, &c. Despite the title, power is taken to manufacture rails, tramway and railway plant and rolling stock, &c. The subscribers are:—Sir Alick D. Gibbons, West Cliff, Bembridge, I. of W. (50 shares); H. H. Bathurst, Finsbury Pavement House, E.C., secretary (1 share). Private company. The number of directors is not to be less than two or more than seven; the subscribers are to appoint the first; remuneration as fixed by the company; secretary, H. H. Bathurst; solicitor, A. G. Jones, 6, Stone Buildings, Chancery Lane, W.C.

Hemming Cond.it Grip, Ltd. (136 373).—This company was registered on June 12th, with a capital of £2,000 in £1 shares, to carry on the business of manufacturers and factors of electrical and other fittings. The subscribers (with one share each) are:—A. E. Beck, High House, Kings Norton, Worcs., Birmingham, engineer; J. R. A. Hemming, 39, Westbourne Street, Walsall, Staffs., manager; A. E. Sayer, First Tener, Jersey, gentleman. Private company. The number of directors is not to be less than two or more than five; the first are A. E. Beck and J. R. A. Hemming; qualification, 250 shares. Registered office, Lincoln's Inn Chambers, Corporation Street, Birmingham.

Telenews (1904), Ltd. (136,386).—This company was registered on June 12th, with a capital of £80,000 in £1 shares (15,000 participating preference), to adopt agreements (1) with Telenews, Ltd., A. B. D. Lang and J. A. Powell, and (2) with the National Telewriter Co., Ltd., to carry on the business of advertisers, advertising contractors and agents, publishers, news, and press agents, distributors of writing signs, news, messages and information, manufacturers of, and dealers in, telewriters, telautographs, lamps, wires, cables, insulators, accumulators and other apparatus, electrical engineers, &c. The subscribers are:—R. Bence-Jones, D.L., J.P., Lasselan, Clonakilty, Co. Cork, 500 shares; V. W. F. Dickins, The Oaks, 20, Arkwright Road, Hampstead, N.W., director, 500 shares; F. A. Dickens, Julian Hill, Weybridge, director, 500 shares; J. A. Powell, Oakleigh, Brighton Road, Purley, Surrey, merchant, 1 share; F. English, Dunolly, Bow Lane, North Finchley, secretary, 1 share; L. Stevens, Weycote, Byfleet, Surrey, chartered secretary, 1 share; G. C. L. Money, 36, Lexham Gardens, Kensington, solicitor, 1 share. Minimum cash subscription, £7,500. The number of directors is not to be less than three or more than seven; the first are R. Bence-Jones, V. W. F. Dickens, J. A. Powell and F. English; qualification (except first directors), 500 shares; remuneration, £100 each per annum (chairman £150), to be increased according to profits. Registered office, 6, Broad Street Place, E.C.

G. W. Green & Co. (Feltham), Ltd., (136,357).—This company was registered on June 11th, with a capital of £5,000 in £1 shares, to take over the business carried on at Q Fel Works, Feltham, as "Geo. W. Green & Co.," and to carry on the business of mechanical and electrical engineers, ironfounders, contractors, manufacturers of, and dealers in, agricultural, railway, tramway, electrical and other apparatus, &c. The subscribers are:—G. W. Green, 12, Mortlake Road, Kew, Surrey, civil engineer, 1 share; R. O. Pickmere, 74, Disraeli Road, Forest Gate, E, electrical engineer, 1,000 shares. Private company. The number of directors is not to be less than two or more than five; the first are G. W. Green and R. O. Pickmere; secretary, R. O. Pickmere. Registered office, Q-Fel Works, Feltham, Middlesex.

CITY NOTES.

Globe Telegraph and Trust Co., Ltd.

THE directors report that the net revenue for the year ended May 31st, after deduction of expenses, amounts to £209,773, plus £26,817 brought forward. There has been distributed £131,085 in interim dividends, leaving an available balance of £105,505. The directors now recommend the payment of the following final dividends, viz.: 3s. per share, less income-tax, on the preference shares, making, with previous distributions, a total dividend for the year on those shares at the rate of 6 per cent. per annum, less income-tax; and 6s. per share net on the ordinary shares, making, with previous distributions, a total dividend on these shares at the rate of 6 per cent. net for the year. These dividends will absorb £79,781, and leave £25,724 to be carried forward.

National Telephone Co., Ltd.

THE liquidator (Mr. GEORGE FRANKLIN) has issued his report to the shareholders of his acts and dealings and of the conduct of the winding-up for the period from the 26th January, 1913, to the 30th May, 1914 (the close of the liquidation). His last report dealt with the accounts for the period ending 25th January, 1913. There was, at that date, a balance due from the Postmaster-General under the award of the Railway and Canal Commissioners, of £2,515,264, and the Postmaster-General had given notice of his intention to appeal against so much of the judgment as related to the award of £247,189 for the cost of raising capital and £150,000 for the cost of obtaining subscribers' agreements. A cross notice of appeal was served by the company. After a preliminary question raised by the company had been decided in favour of the Postmaster-General by the House of Lords, a compromise was effected whereby the award was reduced by the sum of £45,000, making the net balance due under the award £2,470,264, the company also agreeing to forego their claim for costs in the arbitration. The Postmaster-General was entitled to set off against the amount due under the award the rentals for unexpired terms and other sums due from the company, amounting in the aggregate to upwards of £1,700,000. This claim, including further payments made by the Postmaster-General on account of the liquidator, was eventually settled by agreement at £1,725,367. On the 16th July, 1913, Mr. Justice Sargant decided that the whole of the surplus assets then remaining in the liquidator's hands, after satisfying the claims of creditors and the costs of winding up and of those proceedings, were divisible amongst the holders of the deferred stock, and that the first, second, and third preference shareholders who had been repaid the amount of their capital at par, and the holders of preferred stock who had received repayment of capital and in addition a bonus of five per cent., were not entitled to participate in such surplus assets. The preference shareholders and holders of preferred stock were allowed until 13th October, 1913, to appeal against this decision, but no notice of appeal was given. Various difficulties arose in connection with unclaimed dividends and subscribers' deposits, and on the advice of counsel a summons was taken out and heard before Mr. Justice Sargant on the 9th February last, when an order was made for a final distribution, subject to the payment of all claims of which notice had then been given and the deposit of £250 in Court to meet any subsequent claims which might arise. This sum of £250 was paid into Court on 24th February, 1914. The deferred stockholders have been paid the par value of their holdings together with a premium of 5.48 per cent., as follows:—

12th March, 1913	...	...	75 per cent.
29th July, 1913	...	...	22 ,,
31st October, 1913	...	...	7 ,,
25th March, 1914	...	...	1.48 ,,
			105.48 ,,

A sum of £40,375 was paid into the company's liquidation account on the 12th April, 1913, and £20,000 on 31st October, 1913. On making special application, interest at the rate of 2 per cent. per annum was allowed on these deposits, but on the withdrawal of these sums poundage at the rate of 3d. in the £ was deducted. The interest (less tax) amounted to £815, and the poundage to £765. The loss on the realisation of the exchequer bonds amounted to £552,016, equal to 4.42 per cent. on the total amount receivable from the Postmaster-General under the award, and 5.90 per cent. on £9,352,698, payable by him in exchequer bonds. This loss represents 14.8 per cent. on the amount of the deferred stock. The expenses of the arbitration proceedings and liquidation (£171,766) are together equivalent to 1.82 per cent. on the total amount realised. The liquidator places on record his appreciation of the very valuable assistance given in the arbitration proceedings and during the conduct of the liquidation, by the company's solicitor (Mr. W. E. Hart), engineers (Messrs. Gill & Cook), secretary (Mr. Albert Anns), general superintendent (Mr. S. J. Goddard) and other officers, who have all worked loyally in the interests of the company.

Imperial Tramways Co., Ltd.

THE directors report as follows to the 31st December last:

Middlesbrough, Stockton and Thornaby Electric Tramways.—The gross receipts of this undertaking amount to £60,286 as compared with £56,719 for the preceding year, an increase of £3,567. The passengers carried were 12,006,616, against 11,214,750, an increase of 791,866. The net profit was £17,824, as compared with £17,413 for the corresponding period. The traffic receipts shew considerable expansion, being nearly £4,000 higher than in any previous year. The work of reconstructing the permanent way has been continued during the past year, with the result that the whole of the track, except about one and a half miles, has been completely renewed. Since the close of the year the directors have inaugurated services of motor omnibuses in Middlesbrough and intend to introduce the further number of omnibuses necessary to provide all the travelling facilities which may be required by the districts in proximity to the company's tramways. A large building in Middlesbrough, covering nine-tenths of an acre, and formerly used as a skating rink, has been secured for the purpose of a motor omnibus garage.

Corris Railway Company.—The working of this undertaking shews a profit of £187, being an increase of £77.

London and Suburban Traction Co., Ltd.—In lieu of its former holding of London United Tramways preference shares, this company now holds 122,230 five per cent. cumulative preference shares of £1 each and 112,451 ordinary shares of £1 each in the London and Suburban Traction Co., Ltd., and has received the full dividend for the past year on the preference shares of that company. The published revenue account of the London and Suburban Co. does not shew a sufficient balance to pay a dividend on the ordinary shares, but the directors explain that their motor omnibus fleet was not in full service until August last, and they anticipate a considerably increased revenue in future years.

General.—The company's net revenue account for the year shews an available balance of £31,819, and, after payment of interest on the debenture stock for the year, there is an available amount of £19,107, which it is proposed to appropriate as follows:—Dividend for the year at six per cent. on the preference capital (less income tax), paid 1st January last, £11,300; Dividend for the year at four per cent. on the ordinary capital (less income tax) £7,533, and to carry forward £273.

Nairobi Electric Power and Lighting Co., Ltd.—**The annual meeting is postponed for one week, and will be held at 50, Mark Lane, E.C., on July 8th.**

Canadian General Electric Co., Ltd.—**The directors have declared a quarterly dividend of 1¾ per cent. for the three months ending June 30th on the common stock.**

Vulcan Boiler and General Insurance Co., Ltd.—**The directors announce an interim dividend of 4s. 6d. per £2 10s paid share.**—*Financial Times.*

Aluminium Corporation, Ltd.

MR. KENNETH M. CLERK presided on Wednesday at Salisbury House, E.C., over the fourth annual meeting.

The CHAIRMAN, in moving the adoption of the report (ELEC. REV., p. 990), said that the second debenture issue had now been paid up in full and there were loans amounting to £14,000. This money was absolutely necessary to meet certain heavy expenditure, principally for the purpose of completing the carbon works at Dolgarrog, the making of a canal from the river right up to the works, and the preparatory work in connection with the cutting of the tunnel to connect the Dulyn water to their present lake. The new carbon works had proved of very much greater advantage to the company than was originally anticipated and the canal had been a distinct success. With regard to the tunnel referred to, last year he told them the directors had decided to proceed with this work, and a contract had now been entered into for its construction. It had so far been a somewhat slow undertaking, but he thought they could look forward to having the use of the Dulyn water at no very distant date. By then their water power would have been very greatly increased, and the increase, the directors trusted, would in course reflect favourably as regarded the trading profit. The trading profit showed an increase of £6,000 over last year. After deducting debenture interest, legal expenses and trustees' charges, and making allowance for directors' fees which had not been drawn, there had also to be taken into account last year's debit balance—the special expenditure during the year of the Bauxite Refining Co., as well as the figures for preliminary expenses which the directors had deemed expedient to wipe out. Notwithstanding all this, they carried forward a small balance to the good, and he trusted they had seen the last debit balances. He regretted that it had not been possible during the past year to earn sufficient to pay off something of the accumulated interest upon the preference stock, but as they would have noticed, their progress had been steadily upward and had it not been for the abnormal shortage in the rainfall at Dolgarrog during 1913 they should have shown a still larger return. On the other side of the balance sheet the figure under the heading of water power, &c., had increased by £25,000, and this expenditure he had explained. In view of the fact that they were closing the works at Wallsend, the directors considered it advisable to have an independent valuation made of these assets and he was very pleased to inform them that the valuation had fully justified the figures shown and had proved that the company's assets were not by any means overvalued in the books. The investments in subsidiary companies were composed almost entirely of shares in the Bauxite Refining Co. and a small amount for the company's interest in the Société Anonyme des "Bauxites du Var," which was a small French company formed for holding this company's properties in France, as it was found that the holding of these properties by their own company in England would involve considerable risk and expense. All the shares in the French company were, of course, in the hands of the Aluminium Corporation. The stocks in hand showed a slight increase while the sundry debtors and cash in hand were decreased. They would no doubt recollect that on the reconstruction of the company considerable difficulty was experienced in placing the small debenture issue of £50,000 and it was necessary to create 5,000 participating shares entitling the holders to one-fifth of the profits and one-fifth of the assets, immediately after the debentures. These shares had proved somewhat of an inconvenience and as they would readily understand, made it almost impossible for the company to raise further sums of money from outside sources at a reasonable rate of interest. After some negotiations, he succeeded in purchasing, at a premium, a considerable block of the company's debentures accompanied by their proportion of participating shares, and in conjunction with Mr. Bott, who was also considerably interested in the debenture issue, they had succeeded in coming to an arrangement, subject to the approval by the shareholders, by which the present 5,000 participating shares would be given the same rights as 40,000 preference shares, thus definitely deciding their value and place in the company's capital. This arrangement was of a give and take nature, for while it clearly defined the value of the participating shares, which would be an advantage both to the holders and the company, it did not take advantage of their full rights, for to obtain one-fifth of the assets, it would really be necessary to give the participating shareholders over 40,000 preference shares and an equal number of ordinary shares. In connection with this matter it had been anticipated that an extraordinary meeting would have been held after that meeting, but owing to a printer's error in regard to the notice calling the meeting, that would have to be held another day. He would like to add that the arrangement, if approved of, would have the effect of freeing the company from their present difficulty in presenting a clear statement, should, as he thought it very possible, they wish to obtain further financial assistance for the increase of the water power, etc. He thought it only fair to himself and equally fair to the shareholders to mention that the cash of the second debentures as well as the loans referred to at the outset, had all been found by himself. No other means were available and he saw such personal assistance was absolutely essential to the company's success. He was not at all disposed, however, to continue to finance the company and as he had indicated it was highly probable the directors would have to resort to other financial arrangements in respect of the increase of water power, &c. With regard to the future, he could only repeat the remarks he made last year. He had still much faith in the maintenance of the price of the metal at its present reasonable level and it became daily more evident that the uses to which aluminium could be put with advantage, were being increased. It was with the company, practically a question of how much water power they could obtain. The initial difficulties to get the manufacture into swing had been overcome, and he felt quite safe in saying that the organisation of the company had been placed on a sound footing and that they were now on the way to overcome what they trusted would be the last of their difficulties. It must be borne in mind, however, that there were two years' dividends due upon the preference shares and that the full benefit of the entire water supply available would not be obtained without the necessary funds to carry out the required works and the time necessary within which to complete the operations.

MR. S. G. BIBBY seconded the motion and said he thought he ought to say that it was due to the Chairman that the promising position of to-day had been reached. The Chairman had continually found money to atone for the mistakes made in the inception of the scheme and also to increase the output of the furnaces. He therefore thought they ought to record their great appreciation of the work Mr. Clerk had done for the business.

The report was adopted and the retiring directors re-elected.

DR. MOODY proposed a vote of thanks to the Chairman for the services he had rendered to the Company, and this was seconded by MR. ASHTON, and agreed to.

Delhi Electric Tramways & Lighting Co., Ltd.

THE directors report that for the year ended 31st December, 1913, the gross receipts were:—Tramway undertaking, £8,861; Electric supply undertaking (including £3,089 on account of current sold to tramways), £16,439. The revenue from the Tramway Undertaking shows an increase of 32 per cent. over the revenue earned in 1912. The increase is due to the revision of the fares and stages referred to in the last report. The gross revenue from the Electricity Supply Undertaking (excluding supply to tramways) shows an increase of 46 per cent. There has been a considerable growth in the demand for the supply of current for power purposes during the year. The combined undertakings show a net revenue of £6,252, as compared with £2,990 in 1912; £7,832 for the fourteen months to 31st December, 1911 (Durbar period); and £3,232 for the twelve months to 31st October, 1910. After charging expenditure in London and Delhi, and debenture and loan interest, the profit and loss account shows a profit for the year of £2,585. Of this sum, £1,596 has been transferred to renewals reserve account, and, after deducting the loss brought forward, there remains £214 to be carried forward. The net result of the year's operations may be regarded as encouraging, particularly in view of the fact that, for several months during the year, the oil engine had to be laid off owing to the breakage of the main crank shaft. One of the steam engines was laid off for some time owing to a similar mishap. The company suffered considerable loss owing to these breakdowns, particularly in the Tramway Undertaking, where, for some months, the service was curtailed, and, for a period, entirely suspended. The cost of these special renewals has been charged to renewals reserve account. In addition to the special renewal work above referred to, the whole of the company's plant and equipment, including rolling stock, has been systematically overhauled during the year under review. The expenditure under this head has been charged against the year's working. The manager reports that the whole of the equipment, with the exception of the cars, is now in good condition. With a view to meeting the increased demands upon the system, the directors recently decided to instal a further Diesel engine and generator, and the set commenced working on 9th instant. The reports of the general manager indicate that it will be necessary, owing to the continually increasing demand, to instal further power plant next year, in addition to which funds will be required for extensions of mains and the provision of new cars and other equipment. The directors are at present considering the advisability of making an issue of second debentures in order to meet these requirements.

Prospectus.—There has been circulated among shareholders of the British Coalite Co., Ltd., a statement offering an issue of 50,000 6 per cent. participating preference shares of £1 each at par, in the Barnsley Smokeless Fuel Co., Ltd. The company has been formed to erect and work in co-operation with the Old Silkstone Collieries, Ltd., on their property at Barugh, Barnsley, a smokeless fuel plant capable of treating 200 tons of coal per day under the patents and processes of the British Coalite Co., Ltd. The Yorkshire Electric Power Co., one of whose generating stations adjoins the proposed site of the new fuel plant, has agreed to take the whole of the surplus gas from the plant, for the production of electrical energy, and it will nominate one of the first directors after allotment.

United Electric Tramways of Montevideo, Ltd.

MR. G. A. TOUCHE, M.P., presided on Monday, at Winchester House, E.C., over the annual meeting.

In moving the adoption of the report (ELEC. REV., page 1003) the CHAIRMAN said that they were met to review the results of a rather unsatisfactory year. From a tramway point of view it had been a bad weather year, not a bad weather year in the meteorological sense; that had been reserved for the present year in Montevideo. They had 237 fine days as compared with 171 in the previous year, while the percentage of cloudy, windy and rainy Sundays and holidays was only about one-half that of the previous year; but it was a year of bad weather financially in South America, and, indeed, other parts of the world. The effects of the money stringency were manifest in Montevideo. The number of visitors from the Argentine, where there was a great financial depression, was much reduced. The summer season, when bumper traffics were expected, was terminated at an unusually early date, and involved the loss of almost a whole month's extraordinary traffic at the best season of the year. Then many of the most important services were disorganised owing to extensive paving works which were in progress throughout the year. The principal street in Montevideo, 18 de Julio, the backbone of the city, through which some of their most important lines ran, was practically closed to traffic. Services were diverted to other streets, but it meant a considerable loss of traffic. The condition of affairs was unfortunate, but it could not be avoided. These various circumstances combined to affect traffics adversely, and the net result did not show the same ratio of improvement as in former years. The traffic receipts for the year were £373,526, as compared with £346,306 in the previous year—an increase of £27,220, or 7.86 per cent. The number of passengers carried was 44,622,690, as against 40,736,202 last year, an increase of 3,886,488, or practically 9½ per cent. The population of Montevideo was carried about 120 times, as against 117 times last year. The operating expenses were 59.58 per cent of the gross receipts, as compared with 57.44 per cent. a year ago—an increase of 2.14 per cent. That was partly accounted for by the increase in wages, and partly by the increase in renewals and maintenance charges. The net traffic receipts were £150,985, as compared with £147,401, showing an increase of £3,584, or 2.43 per cent. The small ratio of increase was due to the fact that, while expenses had shown a normal expansion, the ratio of gross receipts had not been so good. Profit and loss account showed total credit of £147,684, as compared with £139,882 a year ago, or an increase of £7,802. The charges to profit and loss were increased by £4,242, being chiefly interest on additional debenture stock and extra income tax. The net profit for the year was £91,281, compared with £87,720. It was usual to give some information with regard to the figures of the current year, and he was now in a position to give those in respect of the half-year of the native company to the 30th April, 1914. The traffic receipts were £200,181, an increase of only £419 over the same period in the previous year. Unfortunately, unsettled weather prevailed during practically five out of the six months, and this was reflected in the receipts. The working expenses were 55.99 per cent. as compared with 55.49 per cent. in the corresponding period of the previous year. Some economies had been put into force, and it was hoped that these would in some degree counteract the lack of growth in takings. The net receipts for the half-year were £88,095, as compared with £88,915, or a decrease of £820. Practically, there had been no season, in the ordinary sense, in the year which was now current, which had been one of bad weather and bad trade. The results for the half-year were further adversely affected by an exceptionally heavy storm—practically a cyclone—about the middle of April. Much damage was caused and services were seriously interrupted. The capital expenditure during the year had been heavy, partly due to various extension works in progress, and partly to the cost of new paving and track reconstruction in connection therewith. The expenditure during the year amounted to a total of £122,157, as compared with £78,228 in the previous year. The property account now stood at a total of £2,032,426. Most of the extensions carried out during the year were referred to at the previous meeting. The construction of the Reducto car-shed had been completed, and also the extension to the main car-shed at Carmen station. The amount expended on these works during the year was £29,193. The construction of the two new sub-stations was proceeding satisfactorily. The buildings were practically finished, and the batteries installed. The first Diesel set had been erected at Marfonas, and it was expected that this station would soon be ready for operation. The sub-station at Sayago was expected to be ready for service in time for the heavy traffic of the next summer season —from December, 1914, to February, 1915. The expenditure during the year in connection with both sub-stations amounted to £17,062. The construction of double track in Calle Minas —a service previously operated by a single track with turnouts—was also carried out during the year. This work was necessary owing to the growth of traffics on the lines using the street, and had enabled services to be run with more advantage, not only to the company but also to the travelling public. That represented a cost of £4,173. The new buildings for the administration offices were completed and in occupation. The centralisation of practically all the staff under one roof had great advantages. The further expenditure on this work during the year amounted to £10,596. The repaving of certain streets in Montevideo with asphalt and the consequent reconstruction of the company's track had continued during practically the whole year, and the expenditure incurred in this connection alone amounted to £42,310. This expenditure was more or less outside the control of the company, and was likely to be continued over a period of years if the repaving scheme of the municipality were carried into effect. The company, under its concessions, had to pay a proportionate cost of new paving in streets. Where these were double tracks they had to pay practically two-thirds of the cost. The provision of additional rolling stock was necessary in order to meet traffic requirements. Further cars would have to be purchased during the current years and also during the following two or three years. It might be found necessary to make further extensions to the plant, but at the present time nothing definite had been settled. With regard to this and all such matters they would find Mr. George Balfour's advice and counsel of great assistance. Further share and debenture capital for a total of about £230,000 was issued during the year. In a progressive business in a growing city it was impossible to stand still, and, as the limit of expension had, happily, not been reached, a further enlargement of capital account to meet inevitable extensions should be looked forward to, if the conditions were favourable. The political situation was an important factor in considering the wisdom of a programme of extension involving further capital expenditure. In Uruguay political questions were interwoven with nearly all matters, and this had not made the financial situation any easier. It was useless to ignore the fact that Uruguayan securities, which, until a few years ago had been steadily advancing in credit, had been rather out of favour in recent years. The Chairman dealt at some length with the political situation, and said that one great safeguard of Uruguay was that her statesmen were honest and her courts pure and impartial. In conclusion the Chairman expressed the approval of the board for the services rendered by the staff.

Mr. H. A. TROTTER seconded the motion, and it was carried.

The B.E.T. Report.

THE income from interest and dividends on investments, net profit on working of undertaking, interest on loans and deposits, and sundry profits and fees (termed gross profit in the report) as exhibited by the revenue account for the twelve months ended 31st March, 1914, at £225,754, shows an improvement of some £15,000 as compared with the result of the year 1912-13. Augmented by the balance brought into the account from the previous year, we have a total of £238,248, of which debenture stock interest absorbs £91,383, and improvement and general expenses, and other charges dispose of £20,781. Various amounts written off or placed to reserve account for £56,485, leaving a balance of £69,597, £24,215 of which satisfies the dividend for the year on the 6 per cent. cumulative preference stock. The payment of 3½ per cent. for the year on 7 per cent. non-cumulative preference stock requires £28,251, leaving the carry forward at £17,129. The resources of the revenue account do not afford any return on the 6 per cent. ordinary non-cumulative stock and the deferred ordinary stock. Besides there are the non-interest bearing income certificates redeemable out of profits only amounting to £266,371. A marked feature of the accounts is the reservation against investments and undertakings out of the income of £50,000, which is a step in the right direction.

During the year there was a profit on the sale of investments of £19,686, which was added to the reserve, but there were losses of some £20,000 on the sale or realisation of investments in Brighton and Shoreham Tramways, Cavehill and Whitewell Tramways Co., and other investments.

There is now reserved £27,500 against expenditure on undertakings at Barrow and Mumbles, and the reserve for depreciation appears at £602,922. There are additional reserves against specific assets of debtors, and buildings and land, of £36,666 and £4,935 respectively.

The sundry debtors and debit balances, less revenue, appear in the balance sheet at £201,687, of the nature of which the schedule appended to the accounts affords no indication.

The amount outstanding on the mortgage on Federation Offices, Kingsway, figures among the liabilities at £19,200. It is satisfactory to note from the report that a memorandum will be presently issued with regard to proposals for reduction of the capital arising out of the question of depreciation in the value of the company's assets. This course is imperative when we read that of the investments standing in the books at £5,143,473, £1,529,533 which had published values or were dealt in on the London Stock Exchange, at 31st March, 1914, showed a depreciation if taken at middle prices of £374,466, the auditors being unable to form an opinion of the value of the remaining investments, stating that out of the total investments (£5,143,473) securities representing approximately £1,300,000 yielded no return to the company in the year.

During the past year the Northern General Transport Co., Ltd., was formed for the purpose of consolidating the interest of the following B.E.T. subsidiary companies:—Tynemouth and District Electric Traction Co., Jarrow and District Electric Traction Co., Ltd., Gateshead and District Tramways

Co.—the majority of the share capital of the three companies being held by the Transport Co.

The Scottish General Transport Co., Ltd., was also formed for similar purposes in regard to the B.E.T. Scottish subsidiaries, viz.: Airdrie and Coatbridge Tramways Co., Greenock and Port Glasgow Tramways, and the Rothesay Tramways Co., the majority of the share capital of the three companies being now held by the Transport Co.

Underground Electric Railways Co. of London.—A special meeting of this company was held at the Westminster Palace Hotal, on 15th inst., at which resolutions were passed, so altering the articles as to convert the company into a share and securities holding company. Sir Edgar Speyer, who presided, said that the assets now consisted almost entirely of holdings in stocks and shares in subsidiary companies, but as it was not such at law they could not declare a dividend without an annual valuation of assets.

India-Rubber, Gutta-Percha and Telegraph Works, Co., Ltd.—A half-yearly general meeting will be held at 106, Cannon Street, E.C., on Thursday, 25th inst., for approving of the following dividends:—Preference shares, 5s. per share, less income-tax, half-yearly dividend (at the rate of 5 per cent. per annum); ordinary shares 5s. per share, free of income-tax, being an interim dividend of 2½ per cent.

James Keith & Blackman Co., Ltd.—The accounts for the year to March 31st show (says the *Financial Times*) that after providing for debenture interest and making allowance for depreciation and doubtful debts, the net profit was £24,564 and £3,550 was brought forward. The directors recommend a dividend on the ordinary at the rate of 10 per cent. per annum, free of tax, writing off additional depreciation £3,000, off patents and goodwill £1,878, transferring to reserve £10,000, and carrying forward £3,247.

Stock Exchange Notices.—The following has been ordered to be quoted in the Official List:—

Mississippi River Power.—$16,000,000 common capital stock and $6,000,000 6 per cent. preference capital stock in $100 shares.

Continental.—HUNGARY.—A net profit of £50,382 is reported for the last financial year by the Vereinigte Gluhlampen und Elektricitäts Gesellschaft, of Budapest, an increase of £3,957 over 1912. The dividend is being advanced from 10½ to 12 per cent.

FRANCE.—Among the new electrical companies recently formed in France, are the Société d'Energie Electrique du Secteur Voltaire, Paris (94, Rue Amelot), capital £18,000; and the Société Charentaise de Distribution Electrique, formed at Gemozac (Charente Inferieure), with a capital of £12,000.

AUSTRIA.—The report of the Oesterreichische Siemens-Schuckertwerke Gesellschaft, of Vienna, for the last financial year, shows a net profit of £116,185, an increase of £25,012 over 1912. A dividend of 7 per cent. is again being declared.

Automatic Telephone Manufacturing Co., Ltd.—The share and transfer books are closed from 17th until the 24th inst., for the purpose of preparing the warrants for the 6 per cent. preference shares for the half-year.

National Electric Supply Co., Ltd.—The directors have declared an interim dividend at 3s. per share on the ordinary shares for the half-year ending June 30th.

Penarth Electric Lighting Co., Ltd.—After providing for debenture interest, and transferring £500 to renewals fund, the accounts for 1913 show that the credit balance of £29 brought forward was reduced to £11.

Victoria Falls and Transvaal Power Co., Ltd.—The directors have declared a dividend at the rate of 6 per cent., less income-tax, on the preference shares for the six months ended December 31st, 1912.

STOCKS AND SHARES.

Tuesday Evening.

GENERAL conditions in the Stock Exchange vary a good deal from day to day. The conflicting factors in the situation—such as Ulster, Brazil, Mexico, Canada; the prices of tin, rubber, and so on—are giving the Stock Exchange considerable anxiety, but paramount above these considerations there arises that of the ease in the money market. Money being plentiful towards the end of June is regarded as a healthy sign; and Consols, after a sharp dip upon the French political crisis, started to recover their lost ground. The Brazilian rate of exchange gives no indication of settling down to steadiness, and Mexican issues were put up on Monday for no other reason than that the latest news from that country was less bad than might have been expected.

The Home Railway department is one of the most unsatisfactory round the Stock Exchange. Labour unrest has certainly got upon the nerves—to use the popular colloquialism—of the investing public. It is true that the London General Omnibus Company has managed to arrange terms with its men with a minimum of friction and a maximum of discretion which may well be the envy of stockholders in certain leading English railways that compliment shall leave nameless. Underground Electric shilling shares have hardened to 9s. 9d., and the Income bonds at 90½ are a point higher on the week. Districts, however, after their dramatic movements, eased off a little, which is not surprising, in view of all things. Metropolitans are 1 lower at 38¾; a dull market, too, at that. The Surplus Lands Stock fails to recover from its 2 points drop.

The British Electric Traction group is heavy, pending the unfolding of some scheme for re-arrangement of the Company's capital. Falls have occurred in the Deferred, the 6 per cent. Preferred and the 7 per cent. non-cumulative Preferred stocks. It may be that some of the proprietors are apprehensive of the most junior securities being dealt with in somewhat drastic fashion. The London and Suburban issues are steady.

One of the features in our lists this week is the strength of the Brush Debenture stocks, each of the three securities rising 2 points. This came about as much as the result of the recent inquiries for electrical manufacturing issues as a whole, as of any special demand in the Brush market, although a few buying orders came in, to find holders by no means eager to realise at the present low range of values. Brush Second Debenture stock has for some time past been one of the few stocks paying regular interest and yielding double figures on the money. British Westinghouse Preference have halted a little in their aspiring course, the price at 1¾ showing ⅛ decline, the first for many weeks past. The 4 per cent. Debenture stock is a point to the good.

Other Manufacturing stocks and shares are slightly dull. Small falls are marked in Babcock & Wilcox, Aron Ordinary and British Aluminium Preference. On the other hand, Callender's Preference and Castner-Kellners are both a shade harder, and British Insulated keeps very firm at 9¾.

Electricity Supply shares are quiet. The London group retains its firmness, and there are rises in City Preference, both classes of Westminster shares, Metropolitan Preference, and one or two Debenture stocks. It is declared that, so far from the recent scheme having been scotched by its withdrawal from Parliament, proposals are now receiving close consideration from the principal parties concerned, with a view to evolving yet another scheme patterned on lines rather similar to the last, though differing in various details. As to this, further developments will be awaited by a circle much wider than that comprising proprietors of electrical supply securities.

The Mexican group, as already observed, has strengthened in several of its constituent parts. Mexico Trams have risen to 75, Mexican Light & Power Common shares to 46½, and Mexican Northern Power bonds to 23½. The pitiful losses occasioned through the difficulties of the Canadian agency, and the Southern Alberta and Western Canada Land Companies, have produced little effect upon other Canadian enterprises. Canadian General issues, for example, are unchanged, and in Shawinigan Water a loss of a point has no connection with the troubles just mentioned. Cordoba Light & Power Debenture stock has tumbled 3, to 85½, and one bargain this week has been recorded at 79¾. Victoria Falls Power shares are 1/32 easier, because apparently some had hoped that the company would have been able to clear off more arrears than it has done. By this month's dividend announcement, the dividend is now paid up to the end of 1912.

West India and Panama Telegraph shares of all three classes are now quoted *ex* dividend, and it is worth noticing that the yield on the Ordinary shares now come to 7½ per cent., on the basis of the last dividends. That these are likely to be maintained it is generally expected. The chairman's speech at the recent meeting was couched in none too hopeful fashion, and probably had something to do with certain sellers coming to market. The jobbers, already well supplied with shares, were not eager to take more, and, consequently, the price is dull. For a lock-up, West India and Panama Ordinary should be a good purchase, although it may be a year or two before the Company feels the benefit of the opening of the Canal.

Other Telegraph and Telephone issues hold their ground. American Telephone and Telegraph are better, and a few rises took place in Debenture stocks in this department. Globe Ordinary hardened to 11¼. Great Northern Telegraphs at 32½ are 10s. up. Telegraph Constructions fell a similar fraction to 37. Reuters continue a weak spot, and although 2⅞ was bid for the parent shares at the end of last week, the buyers had no difficulty in being satisfied, with the result that the quotation reacted to its previous level. Canadians are the turn better at 6s. 9d., while American Marconis stick at 14s. and Marconi Marines at 1⅜.

Brazilian Tractions have been an erratic market; at the end of last week the price touched 78¾, from which it has recovered to 80. Most things connected with Brazil have reflected the pleasurable anticipations felt at the prospect of the Brazilian Government being able to raise a loan of about 15 million pounds sterling, which would draw into Brazil the cash that would be so welcome at the present time. Para Electric Railways Ordinary stiffened ¼, and the Tramway Bonds are strong. Anglo-Argentine Trams have again improved, and rises occurred in the Brisbane group.

The rubber share market is as quiet as ever. There seems to be little reason for paying heed to the latest-of-all synthetic scares, but the price of the product keeps about 2s. 4d. a pound, checking enterprise on the part of those who might be inclined to speculative purchases of the shares.

SHARE LIST OF ELECTRICAL COMPANIES.

ELECTRIC RAILWAYS AND TRAMWAYS.—HOME.

NAME.	Stock or Share.	Dividends for 1912.	Dividends for 1913.	Closing Quotations June 16th.	Rise + or Fall —	Present Yield p.c. £ s. d.
Bath Trams, Pref. Ord.	1	Nil	..	⅞ — 1	..	Nil
Do. 5 % Pref.	1	5	5	⅜ — ½	..	6 13 4
Do. 4½ % Deb.	100	4½	4½	70 — 75	..	6 0 0
Brit. Elec. Trac., 6 % Pref.	100	..	..	13½ — 15½	−1	..
Do. Do. Deferred	100	..	..	6 — 8	−1	..
Do. Do. 6 % Cum. Pr'f.	100	6	6	89½ — 91½	..	6 11 2
Do. 7 % Non-Cum. Pr'f.	100	3	3½	56 — 59	−1	5 18 8
Do. 5 % Perp. Deb.	100	5	5	92½ — 94½	..	5 6 0
Do. 4½ % 2nd Deb.	100	4½	4½	77 — 80	..	5 12 9
Central London Railway, Ord.	100	3	3	57 — 62	..	4 16 9
Do. Gtd. Assented	100	..	4	82 — 84	..	4 15 3
Do. Pref.	100	4	4	68 — 73	..	5 9 7
Do. Gtd. Assented	100	..	4	84 — 86	..	4 18 0
Do. Def.	100	2	2	40 — 45	..	4 9 0
Do. Gtd. Assented	100	..	4	80 — 82	..	4 17 7
Do. 4 % Deb.	100	4	4	97 — 99	..	4 0 10
City & S. London, 5 % Pref., 1891	100	5	5	95 — 97	..	5 3 1
Do. Do. 1896	100	5	5	91 — 94	..	5 6 5
Do. Do. 1901	100	5	5	89 — 92	..	5 8 8
Do. Do. 1908	100	5	5	89 — 92	..	5 8 8
Do. 4 % Deb.	100	4	4	86 — 88	..	4 11 0
Hastings Trams, 6 % Pref.	1	6	6†	⅝ — ⅞	..	8 6 8
Do. 4½ % Deb.	100	4½	4½	66 — 70	..	6 8 7
Isle of Thanet Trams, 5 % Pref.	5	2½	3	2 — 2½	..	6 0 0
Do. 4 % Deb.	100	4	4	73 — 78	..	5 2 7
Lancashire United, 5 % Deb.	100	5	5	87 — 89	..	5 12 4
London and Suburban, Ord.	1	..	..	⅞ — 1	..	..
Do. Do. 5 % Cum. Pref.	1	..	5†	⅞ — 1	..	7 5 8
Do. Do. 4½ % 1st Deb.	100	4½	4½	75 — 80	..	5 12 5

NAME.	Stock or Share.	Dividends for 1912.	Dividends for 1913.	Closing Quotations June 16th.	Rise + or Fall —	Present Yield p.c. £ s. d.
London Elec. Railways, 4 % Deb.	100	4	4	90 — 92	..	4 7 0
London United Trams, 4 % Deb.	100	4	4	56 — 60	..	6 13 4
Metropolitan Railway Consol.	100	1⅜	1⅜	38½ — 38⅞	−1	4 3 10
Do. Surplus Lands	100	2⅜	2⅜	59 — 61	..	4 10 4
Do. 5½ % Deb.	100	5½	5½	87 — 89	..	3 18 7
Do. 5½ % Pref.	100	5½	5½	82 — 84	..	4 3 4
Do. 5½ % Con. Pref.	100	5½	5½	79 — 81	..	4 6 4
Metropolitan District Ord.	100	Nil	..	23⅛ — 24	−¼	Nil
Do. 6 % Deb.	100	6	6	138 —141	..	4 5 3
Do. 4 % Deb.	100	4	4	93 — 95	..	4 4 1
Do. 4 % Prior Lien	100	4	4	95 — 97	..	4 2 6
Do. 4½ % First Pref.	100	4½	4½	83 — 86	..	5 4 8
Do. 3½ % Gtd.	100	3½	3½	74 — 76	..	4 12 1
Metro. Elec. Trams, 4½ % Deb.	100	4½	4½	87 — 90	..	5 0 0
Do. 5 % Deb.	100	5	5	85½ — 88½	..	5 18 0
Potteries, Ord.	1	3½	3½	⅞ — 1⅛	..	8 12 10
Do. 5 % Pref.	1	5	5	⅞ — 1⅛	..	4 12 8
Do. 4½ % Deb.	100	4½	4½	81½ — 84½	..	5 6 2
South Metro. Trams, 4 % Deb.	100	4	4	66 — 70	..	5 14 4
Underground Elec. Railways	10	..	..	8⅛ — 8½	+ ⅛	Nil
Do. "A"	1/-	..	..	⅛ — ⅜	..	Nil
Do. 6 % First Cum. Inc. Deb.	100	6	6	115 —117	..	5 2 7
Do. 4½ % Bonds	100	4½	4½	100 —102	..	4 8 2
Do. 6 % Income	100	6	6	90 — 91	+1	6 11 10
Yorkshire (West Riding), Ord.	5	Nil	Nil	½ — ⅝	..	Nil
Do. 6 % Pref.	5	3	4	4¼ — 4½	..	4 4 3
Do. 4½ % Deb.	100	4½	4½	85 — 88	+1	5 2 3

ELECTRIC RAILWAYS AND TRAMWAYS.—COLONIAL AND FOREIGN.

Anglo-Arg. Trams, 1st Pref.	5	5⅛	5⅛	4 13/16 — 5 1/16	+ 1/16	5 8 5
Do. 2nd Pref.	5	5⅛	5⅛	4 15/16 — 5 1/16	..	6 2 3
Do. 4 % Deb.	100	4	4	93 — 95	+ ½	4 4 3
Do. 4½ % Deb.	100	4½	4½	98½ —101½	..	4 8 6
Do. 5 % Deb.	100	5	5	94½ — 96½	..	5 3 6
Auckland Trams, 5 % Deb.	100	5	5	103 —106	..	4 14 3
Bombay Elec. S. & Trams, Pref.	10	6	6	11 — 11⅞	..	5 2 2
Do. 4½ % Deb.	100	4½	4½	95 — 97	..	4 12 9
Do. 5 % 2nd Deb.	100	5	5	100 —102	+1	4 18 0
Brazilian Traction, Light and Power	$100	6	6†	79 — 81	−1	7 8 2
Brisbane Trams Invt., Ord.	5	8	8	6⅞ — 7⅛	+ ⅛	5 10 8
Do. 5 % Pref.	5	5	5	4⅞ — 5⅛	..	4 15 8
Do. 4½ % Deb.	100	4½	4½	100 —102	+1	4 8 1
B. Columbia Elec. Rly., Def.	100	8	8†	109 —113	−1	7 1 8
Do. Pref. Ord.	100	6	6	103 —107	..	5 12 1
Do. 5 % Pref.	100	5	5	104 —107	+1	4 13 7
Do. 4½ % 1st Mort. Deb.	40	4½	4½	97 —100	..	4 10 0
Do. 4½ % Vancouver Deb.	100	4½	4½	94 — 98	..	4 12 0
Do. 4½ % Con. Deb.	100	4½	4½	94½ — 96½	..	4 8 1
Calcutta Trams, Ord.	5	7½	9½	6¾ — 7	..	6 15 9
Do. 5 % Pref.	5	5	5	5 — 5¼	..	4 15 3
Do. 4½ % Deb.	100	4½	4½	98 — 101	+1	4 9 0
Cape Electric Trams	1	5	5	⅜ — ½	..	6 18 4
City Buenos Aires Trams (1904)	5	5	5	5⅛ — 5⅜	..	4 11 11
Do. 4 % Deb.	100	4	4	93 — 98	..	4 2 6
Colombo Elec. Tr. & Lt., 5 % Deb.	100	5	5	91 — 95	+1	5 5 3
Havana Elec. Rly., 5 % Bonds	$1000	5	5	93½ — 97½	..	5 2 6
Kalgoorlie El. Trams 5% A Deb.	100	5	5	82 — 87	−2	5 15 0
Do. 6 % B Deb.	100	3	..	10 — 20	..	Nil

La Plata Elec. Trams, Ord.	1	..	..	1/- — 1/-	..	..
Do. Pref.	1	4½d.	6	3/- — 3/-	..	6 5 0
Lisbon Elec. Trams, Ord.	1	6	6	1⅜ — 1⅝	..	4 9 3
Do. 6 % Pref.	1	6	6	1 3/16 — 1 5/16	..	5 1 0
Do. 5 % Deb.	100	5	5	95 —100	..	5 0 0
Madras Elec. Tr., 6% Cum. Pref.	5	6	6	4⅞ — 5⅛	..	5 14 3
„ Elec. Tr. (1904), Deb.	100	5	5	101 —103	..	4 17 0
Manaos Trams & Lt., 1st Deb.	100	5	5	78 — 81	..	6 3 5
Manila Elec. R. and Ltg., Bonds	$1000	5	5	98½ —100½	..	4 19 6
Mexico Trams Com	$100	7	7	72 — 76	+3	..
Do. Gen. Con. 5 % Bonds	..	5	5	80 — 84	+1	5 19 1
Do. 6 % Bonds	100	6	6	77 — 81	..	7 8 2
Para Elec. Rlys. & Lt., Ord.	5	10	10	3½ — 4⅜	+ ⅛	11 2 2
Do. 6 % Pref.	5	6	6	4 — 4½	..	6 13 4
Do. 5 % 1st Deb.	100	5	5	86½ — 89½	..	5 11 8
Rangoon El. Tr. & Sup., Pref.	5	6	6	5 — 5½	..	5 9 1
Do. 4½ % 1st Deb.	100	4½	4½	95 — 97	..	4 12 9
Rio de Janeiro Trams, 1st Mort. & 5 % Bonds	..	5	5	99½ —101½	+1	4 18 6
Do. 5 % Mort. Bonds	100	5	5	89 — 91	..	5 10 1
Sao Paulo Tram., Lt. and P. 5 % 1st Deb.	$500	5	5	96 —100	+1	5 0 0
Singapore Trams, 5 % Deb.	100	5	5	88 — 92	..	5 8 8
Southern El. Tr. B.A., 5 % Deb.	100	5	5	95 — 97	..	5 3
Un. Elec. Trams Monte Video	5	7	7	4⅜ — 5⅛	..	6 16
Do. 6 % Pref.	5	6	6	4⅜ — 5⅛	..	5 14 3
Do. 5 % 1st Deb.	100	5	5	92 — 95	..	5 5 3
Winnipeg Elec. Rly., 4½ % Deb.	100	4½	4½	93½ — 95½	..	4 14 3

ELECTRICITY SUPPLY AND POWER COMPANIES.—HOME.

Bournemouth & Poole, Ord.	10	6	7	10 — 11	..	6 7 4
Do. 4½ % Pref.	10	4½	4½	9 — 10	..	4 10 0
Do. Second 6 % Pref.	10	6	6	10⅜ — 10⅝	..	5 10 4
Do. 4½ % Deb. Stock	Stock	4½	4½	95 — 98	..	4 11 9
Brompton & Kensington, Ord.	5	10	10	8⅜ — 9¼	..	5 8 1
Do. 7 % Cum. Pref.	5	7	7	8⅛ — 8⅝	..	4 0 0
Central Electric Supply, 4 % Guar. Deb.	100	4	4	89½ — 92½ xd	..	4 6 8
Charing Cross, West End & City	5	5	6	4⅞ — 5⅛	..	5 11 7
Do. 4½ % Cum. Pref.	5	4½	4½	4⅝ — 5	..	4 10 0
Do. "City Undertaking" 4½ % Cum. Pref.	5	4½	4½	4⅜ — 4⅝	..	4 14 9
Do. Do. 4 % Deb.	100	4	4	90½ — 92½ xd	..	4 6 6
Chelsea, Ord.	5	5	5	4⅝ — 5⅛	..	4 17 7
Do. 4½ % Deb.	Stock	4½	4½	97 —100	..	4 10 0
City of London, Ord.	10	9	10	16½ — 17½	..	5 16 0
Do. 5 % Cum. Pref.	10	6	6	15⅜ — 15⅝	+ ⅛	4 7 3
Do. 5 % Deb.	Stock	5	5	116 —120	..	4 7 4
Do. 4½ % Second Deb.	100	4½	4½	100 —103	..	4 8 1
County of London, Ord.	10	6	7	11⅜ — 12⅛	..	5 14 3
Do. 6 % Pref.	10	6	6	11⅝ — 12⅜	..	4 17 0
Do. 4½ % Deb.	Stock	4½	4½	103 —106	..	4 5 3
Do. 4½ % Second Deb.	Stock	4½	4½	99 —102	+1	4 8 1
Edmundson's, Ord.	£8	..	..	⅛ — ⅜	..	Nil
Do. 6 % Cum. Pref.	5	6	6	3⅜ — 4	..	7 10 0
Do. 6 % Non-Cum. Pref.	5	..	..	1⅜ — 2	..	..
Do. 4½ % First Mort. Deb.	100	4½	4½	88 — 86	..	5 4 6
Folkestone	5	6	6	5 — 5½	..	5 9 1
Do. 4½ % First Deb.	100	4½	4½	93 — 95	..	4 14 9

Hove	5	8	9	8⅛ — 9	..	5 0 0
Kensington & Knightsbridge, Ord.	5	8	9	7⅜ — 7⅞	..	5 14 3
Do. 4 % Deb.	Stock	4	4	90 — 92	..	4 7 0
Kent Elec. Power, 4½ % Deb.	Stock	4½	4½	76 — 80	..	5 12 0
London Electric, Ord.	8	2½	3	1⅜ — 1⅝	..	5 10 7
Do. 6 % Pref.	5	6	6	4⅝ — 5⅞	..	5 14 3
Do. 4 % First Mort. Deb.	Stock	4	4	90½ — 93½ xd	..	4 5 9
Metropolitan	5	4½	4½	5⅜ — 5⅝	+ ⅛	5 16 2
Do. 4½ % Cum. Pref.	5	4½	4½	4⅝ — 5	..	4 10 0
Do. 4½ % First Mort. Deb.	Stock	4½	4½	98 —101	..	4 10 0
Do. 5½ % Mort. Deb.	Stock	5½	5½	83 — 86	..	4 1 4
North Metropolitan Power Supply, 5 % Mortgages (Red.)	100	5	5	98 —101	..	4 19 1
Notting Hill, 6 % Non-Cum. Pref.	10	6	6	9⅞ — 10⅜	..	5 14 3
Oxford	5	7	7	5⅛ — 6⅛	..	5 11 0
St. James' and Pall Mall, Ord.	5	10	12	9⅞ — 10	..	6 0 0
Do. 7 % Pref.	5	7	7	6⅞ — 7⅛	..	4 16 7
Do. 5½ % Deb.	100	5½	5½	83 — 86	..	4 1 4
South London, Ord.	4	5½	5½	2⅞ — 3⅛	..	6 10 4
Do. 5 % First Mort. Deb.	100	5	5	99 —102	..	4 18 0
South Metropolitan, 7 % Pref.	1	7	7	1⅛ — 1⅛	..	5 6 8
Do. 4½ % First Deb. Stock	100	4½	4½	97 — 100	..	4 10 0
Urban, Ord.	£8	Nil	..	⅜ — ⅝	..	..
Do. 5 % Cum Pref.	5	3⅛	4	2⅜ — 3⅝	..	6 18 4
Do. 4½ % First Mort. Deb.	100	4½	4½	83 — 86	..	5 4 8
Westminster, Ord.	5	10	10	8⅝ — 8⅞	+ ⅛	5 12 8
Do. 4½ % Cum Pref.	5	4½	4½	5 — 5¼	+1/16	4 5 9

* Unless otherwise stated, all shares are fully paid. † Interim Dividend. ‡ And Funded Certs.

Continued on next page.

SHARE LIST OF ELECTRICAL COMPANIES.—*(Continued.)*

ELECTRICITY SUPPLY AND POWER—COLONIAL AND FOREIGN.

NAME.	Stock or Share.	Dividends for		Closing Quotations June 16th.	Rise + or Fall —	Present Yield p.c.
Adelaide, 6 % Pref.	£	6	6	5¼ — 5⅝	..	5 11 7
Calcutta, Ord.	£	8½	9	7⅛ — 7⅜ xd	..	5 18 0
Do. 5 % Pref.	£	5	5	5 1/16 — 5 1/16	..	4 14 1
Calgary Power, 1st Mort. Bds.	100	5	5	90½ — 92½	..	5 8 0
Canadian Gen. El. Com.	$100	7	8	103 — 108	..	7 5 6
Do. 7 % Pref.	$100	7	7	118 — 123	..	5 13 10
Cordoba Lt., Power and T., Ord.	1	5	..	⅞ — ⅞	..	7 12 0
Do. 5 % Deb.	100	5	5	83 — 88	−3	5 13 8
Elec. Lt. and P. of Cochabamba, 6 % Bonds	100	6	6	81 — 83 xd	..	6 19 6
Elec. Supply Victoria, 5 % 1st Mort. Deb.	100	5	5	91 — 94	..	5 6 5
Elec. Dev. Ontario, 5 % 1st Mort. Bonds	$500	5	5	93 — 95	− ½	5 5 8
Kalgoorlie Elec. P. and L., Ord.	10/-	Nil	..	3/16 — 3/32	..	Nil
Do. 6 % Pref.	£	6	4	¼ — ⅜	..	8 0 0
Kaministiquia Power, 5 % G. Bs.	$500	5	5	101 —104	−1	4 16 2
Madras, Ord.	£	Nil	..	1⅛ — 1⅜	..	..
Melbourne, 5 % 1st Mort. Deb.	100	5	5	105 —108	..	4 12 6
Mexican El. Lt., 5 % 1st M. Bds.	..	5	5	61 — 66	..	7 11 6
Mexican Lt. & Power, Common	$100	4	4†	45 — 48	+1½	..
Do. 7 % Cum. Pref.	$100	7	7	71 — 76	..	9 4 2
Do. 5 % 1st Mort. Gold Bds.	..	5	5	72 — 77	..	6 9 10
Do. 5 % 2nd Mort. Bonds	100	5	5	59 — 64 xd	..	7 13 3

NAME.	Stock or Share.	Dividends for		Closing Quotations June 16th.	Rise + or Fall —	Present Yield p.c.
Monterey Rly., Light & Power, 5 % 1st Mort. Deb.	* 100	1912. 5	1913. 5	51 — 55	..	£ s. d. .. ..
Montreal, Lt., H. and Power	$100	9	10†	226 —231	..	4 6 7
Northern, Lt., Power and Coal, 5 % 1st Mort. Bonds	$500	5a	5a	10 — 20	..	..
River Plate, Ord.	Stock	10	10	235 —245	..	4 1 8
Do. 6 % Non-Cum. Pref.	Do.	6	6	97 —103	..	5 16 6
Do. 5 % Deb. Stock	Do.	5	5	101 —103	..	4 17 0
Roy. Elec. Co., Montreal, 4½ % 1st Mort. Deb.	100	4½	4½	100 —102	..	4 8 3
Shawinigan Water, Capital	$100	5½	6	132 —135	−1	4 8 3
Do. 5 % Con. 1st Mort. Bonds	$500	5	5	107 —109	..	4 11 7
Do. 4½ % Per. Deb.	Stock	4½	4½	99½ —101½	..	4 8 8
Toronto Power, 4½ % 1st Deb.	Do.	4½	4½	96 — 98 xd	−2	4 12 0
Vera Cruz Lt., P. and T., 5 % 1st Mort. Deb.	100	5	5	85 — 87	..	5 15 0
Victoria Falls Power, Pref.	1	6	6	1 1/16 — 1⅛	−3/32	8 0 0
West Kootenay Power and Lt., 1st Mort. 6 % Gold	100	6	6	103 — 105	..	5 14 3

MANUFACTURING COMPANIES.

Aron, Ord.	£	7	..	1 1/16 — 1 3/16	−1/32	8 12 4
Do. 6 % Pref.	£	6	6	⅛ — ¼	..	6 17 2
Babcock & Wilcox	£	16	16	2⅞ — 3	−1/16	5 6 8
Do. Pref.	£	6	6	1⅜ — 1⅝	..	4 7 6
British Aluminium, Ord.	£	..	5	1/16 — 1/16	..	4 14 1
Do. 6 % Cum. Pref.	£	6	6	3/32 — 3/32	−3/32	6 9 0
Do. 5 % Prior Liens Debs.	100	5	5	97 —100	..	5 0 0
Do. Deb. Stk.	100	5	5	90 — 95	..	5 5 3
B.I. & Helsby Cables	£	10	13	9⅜ — 9⅝	..	6 11 8
Do. Pref.	£	6	6	5⅛ — 6⅜	..	4 14 1
Do. Deb.	100	4½	4½	101 —104	..	4 6 9
British Thomson-Houston, Deb.	100	4½	4½	92 — 94	..	4 15 9
British Westinghouse, Pref.	£	Nil	5	1⅛ — 1⅛	−1/16	5 6 8
Do. Deb.	100	4	4	74 — 76	+1	5 5 8
Do. 6 % Prior Lien	100	6	6	101 —104	..	5 16 6
Browett, Lindley, Ord.	£	1	..	2/- —3/-	..	Nil
Do. Pref.	£	1	..	8/- —8/6	..	Nil
Brush, 7 % Pref.	£	2	Nil	0 — ½	..	Nil
Do. 5 % Prior Lien Deb.	100	5	5	82 — 87	+2	5 15 0
Lo 4½ % Deb.	100	4½	4½	52 — 57	+2	7 17 10
Do. 4½ % Second Deb.	100	4½	4½	31 — 35	+2	12 17 2
Callender's Cable	£	15	15	11⅜ — 12⅛	..	6 3 8
Do. Pref.	£	5	5	5⅛ — 5 1/16	+ ⅛	4 13 0
Do. Deb.	100	4½	4½	97 —100	..	4 10 0
Castner-Kellner	£	20	22½	21⅝ — 21 9/16	+3/32	8 9 5
Do. Deb.	100	4½	4½	104 —107	..	4 4 1

NAME.	Stock or Share.	Dividends for		Closing Quotations June 16th.	Rise + or Fall —	Present Yield p.c.
Crompton & Co., Deb.	100	5	5	83 — 85	..	5 17 8
Dick, Kerr	£	Nil	..	⅜ — ⅝	..	..
Do. Pref.	£	6	6	⅝ — ¾	..	6 17 2
Edison & Swan, A, £2 paid	£	Nil	..	0 — 1/16	..	Nil
Do. fully paid	£	Nil	..	1 — 1⅛	..	Nil
Do. 4 % Deb.	100	4	4	58 — 62	..	6 9 1
Do. 5 % Second Deb.	100	5	5	61 — 66	..	7 11 6
Electric Construction	£	5	6	3/16 — 1/16	..	8 14 6
Do. Pref.	£	7	7	1 — 1⅛	..	6 4 5
Greenwood & Batley, Pref.	£	7	7	6⅞ — 7½	..	9 13 2
Do. Deb.	100	5	5	92 — 94	..	5 6 5
General Electric, 6 % Pref.	£	6	6	10 5/16 — 10 5/16	..	5 13 9
Do. Deb.	100	4	4	87 — 91	..	4 8 0
Henley's, Ord.	£	15	20	14⅜ — 15⅛	..	6 9 0
Do. Pref.	£	4⅛	4⅛	4 7/16 — 5⅛	..	4 7 10
Do. Deb.	100	4½	4½	99½ —101½ xd	..	4 8 8
India-Rubber, G. & T.	£	10	7½	9⅜ — 10⅛	..	6 19 5
Do. Pref.	£	10	5	8⅜ — 9⅜	..	5 5 8
Telegraph Construction	£	12	20	20 — 28	— ½	6 6 2
Do. Deb.	100	4	4	98 —100	..	4 0 0
Willans & Robinson, 4 % 1st Mort. Deb.	100	4	..	63 — 67	..	5 19 8
Do. B 4 % Cum. Pref.	100	..	£4	40 — 44	..	9 1 10

TELEGRAPH AND TELEPHONE COMPANIES.

Amazon Telegraph	£	4½	4½	5⅜ — 6½	..	7 4 0
Do. 5 % Deb. Red.	Stock	5	5	95 — 98	+1	5 2 0
American Telep. & Teleg., Cap.	$100	8	8	124 —128	+1	6 5 0
Do. Collat. Trust	$1000	4	4	92 — 95	+1	4 4 3
Anglo-American Telegraph	Stock	8	8	64 — 67	..	4 9 7
Do. 6 % Pref.	Do.	6	6	107⅜ -108⅜	— ½	5 10 1
Do. Def.	Do.	80/-	80/-	23 — 23½	..	6 7 8
Anglo-Portuguese Tel., 5 % Mort. Deb.	100	5	5	102 —104	..	4 16 2
Chili Telephone	£	8	6†	7½ — 7⅝	..	5 6 8
Commercial Cable, Stlg. 4 % Deb.	Stock	4	4	7 — 81	..	4 18 9
Cuba Telegraph	£	10	6†	8½ — 9½	..	6 6 4
Do. 10 % Pref.	£	10	10	16 — 17	..	5 17 8
Direct Spanish Telegraph, Ord.	£	4	4	3½ — 4	..	5 0 0
Do. 10 % Cum. Pref.	£	10	10	7½ — 7¾	..	6 9 0
Direct United States Cable	£	4	4	6⅜ — 6¾	..	5 16 4
Direct W. India Cable, 4½ % Reg. Deb.	100	4½	4½	98 —100	..	4 10 0
Eastern Telegraph, Ord. Stock	Stock	7	7	129 —132	..	5 6 3
Do. 8½ % Pref. Stock	Do.	8½	8½	77 — 79	..	4 8 9
Do. 4 % Mort. Deb.	Do.	4	4	94½ — 96½	+ ½	4 3 0
Eastern Extension	£	10	7	12½ — 13	..	5 7 9
Do. 4 % Deb.	Stock	4	4	95 — 97	+ ½	4 2 6
Globe Telegraph and Trust	£	10	6†	11 — 11¾	+ ⅛	5 4 4
Do. 6 % Pref.	£	10	6	12⅜ — 12¾	..	4 13 4
Great Northern Telegraph	£	10	20	31½ — 33½	+ ½	5 19 5
Indo-European Telegraph	£	25	13	56½ — 58½	..	5 11 1
Mackay Companies Common	$100	5	5	80 — 85 xd	..	5 17 8
Do. 4 % Cum. Pref.	$100	4	4	67 — 72 xd	..	5 11 1

Marconi's Wireless Telegraph	£	20	20	2⅜ — 2⅞	..	6 19 0
Do. 7 % Cum. Partic. Pref.	£	17	..	2 5/16 — 2 7/16	..	6 19 0
Monte Video Telephone, Ord.	£	6	6	4⅜ — 4⅝	..	6 8 0
Do. 5 % Pref.	£	5	5	3⅜ — 3½	..	5 18 6
New York Telep., 4½ % Gen. Bnds.	100	4½	4½	100 — 101	+ ½	4 9 0
Oriental Telep. and Elec.	£	10	10	2 3/32 — 2 9/32	— 3/32	4 7 6
Do. 6 % Cum. Pref.	£	6	6	1 5/16 — 1 3/8	..	4 13 5
Do. 4 % Red. Deb.	Stock	4	4	87½ — 89½	..	4 9 5
Pacific and European Tel., 4 % Guar. Debs.	Do.	4	4	98 — 100	..	4 0 0
Reuter's	£	10	7	7½ — 8½	— ½	8 4 8
Submarine Cables Trust	Cert.	6	6	126 —129	..	4 13 7
Telephone Co. of Egypt, 4½ % Deb. Red.	Stock	4½	4½	98 — 100	..	4 10 0
United River Plate Telephone	£	8	6†	6¼ — 6⅜	..	5 18 5
Do. 5 % Cum. Pref.	£	5	5	5⅛ — 5⅜	..	4 9 0
West Coast of America	2½	2½	N	⅞ — 1½	..	Nil
Do. 4 % Debs., 1 to 1,500 guar. by Braz. Sub. Tel.	100	4	4	96 — 99	..	4 0 10
West India and Panama Teleg.	10	1½	1½	1 7/16 — 1 1/16 xd	..	7 8 2
Do. 6 % Cum. 1st Pref.	10	6	6	9 — 9½ xd	..	6 6 4
Do. 6 % Cum. 2nd Pref	10	6	6	8¼ — 8⅝ xd	..	6 16 9
Do. 5 % Debs.	100	5	5	97 — 99	..	5 1 0
Western Telegraph, Ltd.	10	7	7	13½ — 13⅝	..	5 1 11
Do. 4 % Debs.	Stock	4	4	£6 — 98	+ ½	4 1 8
Western Union 4½ % Fdg. Bonds	$1000	4½	4½	94 — 97	..	4 12 9

* Unless otherwise stated all shares are fully paid. † Interim dividend. a Paid in deferred interest warrants.

Bank rate of Discount 3 per cent., January 29th, 1914.

Electrical Smelting of Iron Ore in Sweden.—The report for 1913 of the Uddeholms A/B, which is the second largest iron manufacturing concern in Sweden, has recently been published and gives some interesting details about the progress of electrical smelting of iron ore. The manufacture of electrical pig-iron was started in 1912 with two furnaces of the Electrometal type, using charcoal for the reduction, each of which has a capacity of about 5,000 tons per annum. In 1913 a third furnace was completed, and the output of electrical pig-iron, which in 1912 amounted to 7,796 tons only, was raised to 13,902 tons. There are now under construction two similar furnaces of a somewhat larger size. This is a sure proof that the company is very well satisfied with the results from the electrical furnaces, and this is emphasised by the following remark that appears in the report: "The electrical pig-iron has continually turned out to be of excellent quality, and it is therefore anticipated that the company will be able to cover its whole requirements for pig-iron from the electrical furnaces as soon as the two last ones have been completed."

The output of ordinary pig-iron from the blast furnaces, which in 1910 was 18,416 tons, had been reduced to 13,713 tons in 1913, and is very likely in the near future to cease altogether. The activity of this company is not based on the production of pig-iron for sale, but on the production of steel, for which the whole output of pig-iron is employed. The company has two electrical power stations, of which one, the Forshult station, has been extended by the installation of additional electrical machinery, so that it is now able to supply 16,000 H.P. instead of 10,000 H.P. The second, the Malta power station, was completed this year, and is capable of producing 4,000 H.P.

The Uddeholm Co. is not a small concern, as the assets at the end of 1913 amounted to about 2½ million pounds sterling. The total turnover in 1913 was about £560,000, of which about £385,000 were iron and steel manufactures.

THE DRYING AND PRESERVATION OF TIMBER BY ELECTRICITY.

By GEORGES DARY.

Wood, as soon as it ceases to exist as a growing tree, quickly becomes a prey to the germs enclosed within it. Therefore, as it constitutes one of the most necessary materials of industry, it is readily realised that it is advantageous to utilise the wood as quickly as possible after the tree from which it is taken has been felled, and to preserve it in perfect condition. The problem is one that has, so far, only been partially solved, for the subject is extremely complex, and comprises, apart from the technical difficulties, various very important economical and industrial requirements. It is, primarily, necessary that the processes employed for the rapid drying of wood shall not be costly or difficult of execution. They should be applicable not only in suitable works, but also on the land, *i.e.*, in woods and forests themselves. It is necessary, also, that the results obtained shall be uniform throughout the whole mass of the wood, and that the constituents of the same shall be absolutely and permanently unalterable in character.

All these conditions are completely realised in the electric process recently patented and put into practice by M. Albert Nodon, whose method of extracting nitrates from peat was noticed in the columns of the Electrical Review a few months ago. So far back as 1896, M. Nodon devised a process for the "senilisation," or ageing of wood, by electricity, but it required a somewhat complicated and costly equipment of vats, screw jacks, cranes, heating apparatus, etc., which rendered the cost of working too high. Not only so, but the method gave somewhat irregular results. M. Nodon, however, continued his experiments, and at last succeeded in modifying the process to such an extent as to render it both practicable and economical. Exhaustive tests carried out in the application of a current of electricity to the drying of wood show it to give rise to a triple action—chemical, physical, and aseptical. As a matter of fact, the results achieved comprise (1) a total and rapid oxidation of the resiniferous materials contained in the sap, (2) a molecular transformation of the cellulose, and the various derivatives which modify the mechanical properties of the timber, and (3) a complete and definite suppression of all the destructive germs contained in the wood.

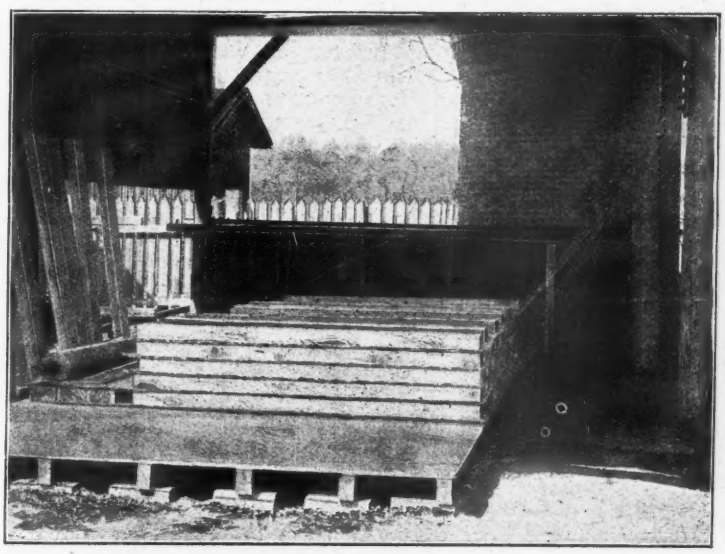


Fig. 1.—The Nodon Process in Operation.

The very simple arrangement for drying and preserving wood devised by M. Nodon is depicted in the accompanying illustrations. It consists of the employment of what is known as "carpet" electrodes, which may readily be transported for use at any place, when previously rolled on a wooden core. The carpets are made of a flexible metallic "cloth," of galvanised iron, fixed between two large sheets of jute, which form absorbing mattrasses. The carpets, after being extended over the wood to be treated, are saturated with water, thus rendering them good conductors of electricity.

If the process is to be carried out in a factory, as shewn in the illustration (Fig. 1), a simple floor is made of joists and floor boards, on which the first wet carpet electrode is laid. On this a layer of green wood, that has been cut to the desired shape and size, in the form of baulks, sleepers, beams, planks, etc., is placed. (In the illustration, the wood in course of treatment consists of baulks of pine *(pinus maritima)* intended to be cut up into wood blocks for street-paving purposes in Paris.) This first layer of wood is covered with another carpet electrode, then another row of wood, and another electrode, and so on, until the pile has reached the desired height, say 1 m. or 1½ m.

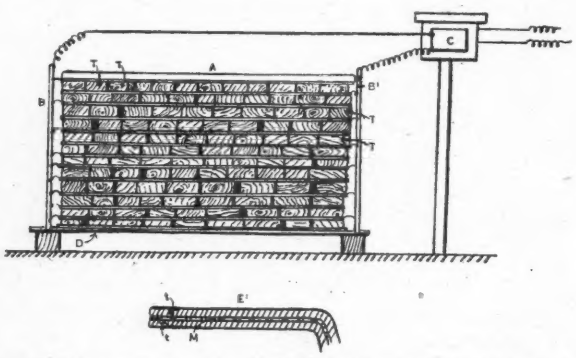
The metallic portions of the carpets are connected to conductors at the sides, the poles of the successive carpets being alternated, in order that the current may pass through each layer of timber (see diagram, p. 1050). In this way, the internal resistance of the pile is reduced to a minimum. The current passes through all the baulks in the direction of their thickness, owing to the conductivity of the electrodes, and the sap in the green wood. The resistivity varies according to the thickness, the amount of essential oil, the degree of humidity, and the time of felling, and ranges between 6 and 20 ohms per cubic metre, remaining practically constant during the whole period of the treatment. To cause a current of an intensity of from 5 to 6 amperes to pass through a cubic metre of wood in the form of baulks, the E.M.F. varies, according to circumstances, from 30 to 100 volts. An alternating current at 110 volts, and 40 to 50 periods, may be utilised, but it is preferable to adopt a lower frequency, say 15 to 20 periods per second, and a lower E.M.F. The latter is regulated to give the desired current by means of induction regulators or transformers. Continuous current at 110 volts may also be employed. The results are the same as with alternating current, but the electrolysis that takes place quickly affects the carpet electrodes, necessitating a frequent reversal of the direction of the current flow through the pile of timber. Regulation of the continuous current can only be effected by means of ohmic resistances, the efficiency of which is lower than that of the induction regulators. For these reasons, it is preferable to employ alternating current.

The process can also be carried out with great advantage in woods and forests when the timber is in full sap, during the summer time, for it is at that period the wood possesses its maximum of vitality and industrial qualities. It is also the best season of the year for outdoor work. The trees can be advantageously cut up by portable electric saws worked by current from a portable steam-operated generating plant, the boiler of which can be fired with the waste timber resulting from the felling and sawing. The piles of wood, with their carpet electrodes, are arranged on a small area of cleared land

near where the trees are being felled, while the treated wood can be stored in any position where it is exposed to strong winds.

The time necessary for drying wood by the Nodon process varies from one to two full days, according to the nature of the timber, and the results it is desired to secure. It may be noted that when the process is carried on too rapidly cracks or splits may be caused in the wood. The current should therefore be regulated to from 4 to 5 amps. per cubic metre, for timber intended for carpentry and cabinet-making work. For other uses, such as railway sleepers, the strength of the current may be increased to 10 amps. per cubic metre. The sum total of the current which should be passed through a cubic metre of wood is 150 amp.-hours; that is to say. the time varies from one to two days according to whether a current of 10 or 5 amps. is employed. The operation can be suspended at the end of the regular working day, and restarted the next morning without inconvenience or drawback. All that is necessary in such a case is to keep the carpet electrodes damp, in order that the resistivity of the pile may not increase. If the timber is not stripped of its bark, an E.M.F. of from 80 to 100 volts is necessary; if, however, it is stripped, and in full sap, a pressure of 40 volts is sufficient.

Wood dried by the Nodon process, or "nodonised," as it is rapidly becoming known in France, is deprived of starch, but retains the resiniferous materials throughout the whole mass. The cellules of the sap-wood have also a characteristically regular appearance, which enables, by means of re-



T, Railway sleepers of green wood; E, "Carpet" electrodes; *t t*, Jute covers of carpets; M, Flexible metallic cloth; A, Baulk of wood lying on top carpet; B, B', Connections for alternate carpets; D, Floor; C, Current distributor.

FIG. 2.—DIAGRAM OF ARRANGEMENT FOR DRYING TIMBER BY THE NODON ELECTRICAL PROCESS.

actions, and micrographic examinations, the wood that has been treated electrically to be distinguished from that which has not been submitted to the process.

The cost of installation and working is restricted to the purchase of the carpet electrodes and the energy consumed. The electrodes are easily made, and their cost works out at an average of about 4 francs per square metre. The cost of electrodes per cubic metre of treated wood is approximately 40 francs, while they have an average life of twelve months, if the necessary care is taken to reduce the wear to a minimum. The depreciation, on this head, works out at approximately 1d. per day and per cubic metre.

As for the industrial applications of the process, these are almost as numerous as those of wood itself. For carpentry and joinery work, perfectly dry timber, that will not become moist, or rot, is necessary. Especially, also, is this the case as regards material for the construction of boats, vessels of small tonnage, bridges, gangways, jetties, etc. Military authorities and public works departments also find it advantageous to employ perfectly dried timber. Some official tests have recently been made, on the application of the French Government, the results of which, and the reports on the same, have been entirely favourable to the process, and some further specific tests for Government Departments are at present in progress. The Nodon process can also be advantageously adopted for the rapid and complete desiccation of certain Colonial species, such as pseudo-mahogany, which come from the African coast in the form of large bark-covered logs, and which, on arrival in France, are still full of sap, rendering their treatment in stoves unsatisfactory. Such material can be treated by the Nodon method not only efficiently but also at a much lower cost.

As regards wood paving blocks, the use of which is steadily increasing in large towns, it has been a general experience that, owing to their relatively short life, they have frequently to be renewed, the processes hitherto employed having failed to give the desired results. An official report, issued in January last by the municipal authorities of Bordeaux, shows, however, that electrically-treated wood gives full satisfaction as regards durability. Indeed, the official report, a copy of which lies before us, states that one of the busiest roads in Bordeaux was partially paved in 1906 with wood blocks treated by the Nodon process, and that, although eight years have since elapsed, the part of the road so paved is still as level as on the day it was laid, while other portions paved with blocks treated in the ordinary way have had to be relaid.

Finally, we may draw attention, among the other important applications, to that of railway sleepers, and pitwood, in addition to telegraph and telephone poles, and electricity transmission masts. It will thus be seen, from the numerous directions in which it can be applied, that the Nodon process promises to effect a radical change in the methods of drying and preserving wood. It may be added in conclusion that the process is in the hands of the Société A. Beaumartin & Co., of 33, Rue St. Genes, Bordeaux, from whom specimens of the treated wood, and any additional information regarding the process, can be obtained.

REVIEWS.

Transformer Practice, by W. T. TAYLOR. London: McGraw-Hill Book Co. Price 10s. 6d. net.

THIS is the second edition of a book published in 1909, on the manufacture, assembling, connections, operation and testing of transformers. The work has been entirely re-written, enlarged and re-set.

The book opens with an account of the enormous increase in the capacity and voltage of transformers of late years. The author points out that the limiting feature in a transmission scheme is now the line itself and not the transformers. In discussing iron losses in a transformer his remarks on the effect of varying the frequency are not clear. He also states that the loss due to hysteresis varies with the hardness of the steel, whereas, as is well known, the loss in alloy steel is very low, and these alloys are generally very hard. There are several other points to which the reviewer has to take exception. For example, it is stated that the core losses in a transformer represent a great loss of revenue, whereas it is the cost of working which is affected, and the revenue is only affected indirectly. Further, it is stated that the copper loss "is within easy control of the designer," but so are all losses within limits, always provided the buyer will pay for it. The copper section cannot be increased without also increasing the iron, or cutting down the quantity of

insulation. Manufacturers of the core type of transformer are not at all likely to agree with the author in the statement that the core type has not in general so good a regulation as the shell type. A general statement of this kind is unjustifiable, since it depends entirely upon the design of each individual transformer whether the shell or the core type will have the best regulation. The reviewer prefers the core type owing to the greater simplicity, and the ease with which repairs can be carried out.

A very brief account of vector representation of transformer problems is given at the conclusion of the chapter.

Chapter 2 deals with simple transformer manipulations. A number of connection diagrams are given, tne majority of which are of a quite elementary character.

Two-phase transformer connections are next considered. Undoubtedly some useful information is given, but the reviewer does not admire the style in which it is presented.

Chapter 4 discusses the three-phase transformation system. This subject is one of the most complicated that electrical engineers have to deal with. For instance, while certain transformer connections are unsafe, and should in general be avoided, special circumstances may arise in which it will be found that the danger incidental to their use is so remote as to be counter-balanced by some advantages which they may offer in the special case, and their use will thus be justified. Probably every type of connection that has been used is given, and very possibly some that have never been used at all. The reviewer has carefully checked those in common use, and finds them correct.

Three-phase transformer difficulties are next considered, but the difficulties dealt with are principally those due to faulty connection only.

Chapter 6 is devoted to the discussion of three phase to two phase systems and transformations. The systems due to Scott, Steinmetz (mis-spelt Steinwetz), and the author are considered in detail.

Methods of cooling transformers are next considered, and the usual arrangements are well described. On page 131, in describing transformer oils, it is stated that for oil-filled water-cooled transformers it is customary to use another grade of oil than that used in the self-cooled type, the oil working at a lower temperature, and consequently a high flash point is not of the utmost importance. Really the use of "white" oils, which have a lower flash point than the "amber" types, is due to their much less tendency to throw down deposit when heated, than the darker coloured high flash test oils. If this depositing goes on in a self-cooling transformer the only harm done is that the ventilating ducts become clogged. In a water-cooled transformer, however, the cooling coils become coated with deposit. Now this deposit is a bad conductor of heat, and consequently the transformer becomes hotter and hotter, and finally burns out, unless the cooling coils are removed and cleaned periodically. Several useful hints on testing transformer oil are given in this chapter.

Chapter 9 is perhaps the most interesting in the book, and deals with the construction of large transformers strictly of the shell and core types of American manufacture. A good deal of useful information is given, but the reviewer has to take exception to several points. It is stated that transformers are very seldom sent in their tanks, but this is becoming more and more a standard practice, and moreover, where practicable, has everything in its favour. A calculation for the forces on transformer coils when a short circuit occurs is given, but the units used are confused. A force is expressed in inch lb., and later on this is called work, and generally the calculation is not at all clearly expressed, which is unsatisfactory. The introduction of a limiting reactance is well discussed, although the treatment would have been improved by the introduction of a numerical example.

Chapters 10 and 11 deal quite shortly with auto-transformers, and constant current transformers respectively.

Series transformers and their operation are dealt with in chapter 12, and this important but relatively small type of transformer is well described.

Chapter 13 contains a clear account of regulators, and compensators, together with a number of useful diagrams.

The last two chapters deal respectively with transformer tests in practice, and transformer specifications. The reviewer has no special complaint to make of the former, except to remark that certain statements made in the earlier parts of the book are repeated. Regarding the specifications, it must be noted that the first specification is purely a manufacturer's specification, and contains expressions which are only intelligible to manufacturers, while the other two are types of specifications given to buyers of this apparatus from one particular firm.

An appendix is given in which the majority of large high voltage transformers operating in various parts of the world are catalogued. In reading down this list, the majority of these transformers are seen to be star connected.

It will be seen from the above that while the book contains a good deal of genuine information, there are many statements made to which exception must be taken, and since it consists of only 278 pages, including the index, it cannot be said to be cheap at the price.

Several obvious misprints occur, and the author has a repetitive style. The binding leaves a good deal to be desired since the new copy that the reviewer is using is already coming to pieces.—H.G.S.

Wireless Telegraphy, by W. H. Marchant. London: Whittaker & Co. Price 5s. net.

This book is primarily intended for the use of those engaged in practical radio-telegraphic work and for students who already possess some knowledge of electrical science. As such it is to be recommended without reserve, for it deals in thoroughly useful manner with the principles and apparatus of all systems at present in extensive use or of considerable practical importance, and does not describe large numbers of circuits and pieces of apparatus which have been proposed and patented without making further advance. In short, the author has provided a well-written and produced treatment of wireless telegraphy as it concerns the average practical worker and student. It is good to see that other systems than the Marconi system rec ive a proportionate share of the total space. Certainly the Poulsen, the Telefunken, the Lepel and Goldschmidt high frequency alternator systems (here treated in Chapters VII-X) deserve more extended treatment than has been given to them in many works now on the market. One noticeable omission from the present volume is adequate treatment of directive wireless and its importance in general radio-practice and in navigation. Some of the blocks and text are reproduced from the "Radio-Telegraphist's Guide and Log Book," by the same author, but this applies only to fundamental matter of permanent applicability. Though following along the same lines as the earlier work, the present volume is by no means a mere reprint, but contains about 50 per cent. more matter and is brought up to date.

The author spares us an historical introduction, for which we are suitably grateful. Chapters I—V deal with the production and radiation of electrical oscillations and waves, and include descriptions of the various pieces of apparatus which go to make a radio-telegraphic installation and the principles which govern their construction and erection. Con-

siderable space is given to the description of the Marconi 1½ KW. ship set, this being in such general use that few candidates for the P.M.G.'s certificate pass on any other apparatus. Since ship operators will doubtless represent a large proportion of the purchasers of this work, a chapter should surely have been devoted to radio-phares and other special applications of wireless to shipping and navigation.

A full description of the Poulsen apparatus for hand and automatic working is presented in Chapter VII, and the quenched-spark system of producing oscillations is represented by descriptions of the Telefunken I.T.K. set and of the Lepel system. The Goldschmidt alternator is dealt with briefly and clearly, and a special chapter is devoted to portable installations, including sets for military use, airships, yachts, and small craft generally. The remaining five chapters are specially valuable, and deal respectively with the apparatus necessary and methods of making all the more important wireless measurements; the making and interpretation of diagrams (a short and elementary but very useful chapter); the chief regulations and instructions for radio-stations licensed by the P.M.G.; various codes and abbreviations used in working; and the localisation of faults. No mention is made of radio-telephony. This subject is here specifically excluded by the title, but it is noticeable that several works have appeared recently which deal with telegraphy to the exclusion of wireless telephony. Whether this is wise, is at least open to question, for it seems doubtful whether there will ever be anything like such great distinction between the two wireless systems as between the two methods of communication by wire. Indeed, it is quite within the bounds of possibility that wireless telegraphy will in future be effected by apparatus designed specifically for telephonic work. Omission to deal with radio-telephony must not, however, be counted against the treatise here reviewed. Numerous as are the wireless treatises now available, we believe this volume will be given an easily accessible place on the bookshelves of most radio-workers and students.

NOTES FROM CANADA.

[FROM OUR SPECIAL CORRESPONDENT.]

SOME considerable time ago the writer of these notes suggested that a branch of the B.E.A.M.A. might be formed in Canada for the furtherance of British electrical export trade with this country; an editorial a short while previously also referred to the same matter.

The writer does not know whether the question has ever been taken up and discussed by the B.E.A.M.A. Committee or not, but he has recently been approached by the representatives of several home firms here who are anxious that, if possible, some action might be taken, having for its object the formation of a local branch.

There are represented in Eastern Canada alone about 25 British electrical firms who are believed to be members of the Association referred to; the local representatives of 10 of these have been communicated with, and nine of them at once said that they would be very glad to see a Canadian section formed, and would do what they could to support any proposal made with that end in view, and would recommend it to their principals at home; the tenth man made some demur, but did not deny that such a branch ought to be able to make itself useful and advance the interests of British firms.

The said British firms by no means have too rosy a time of it over here for the following reasons :—

1. Very many Canadian-born engineers get their training in the U.S.A., and, therefore, have little or no knowledge of, or sympathy with, British manufacturers or their products.

2. The National Electric Code Rules do not make it any too easy for home products in certain lines to be sold in the Canadian market.

3. There is a tendency in some quarters to decry British products and enlarge upon any differences in type or features of design as being actual defects—such things require to be nipped in the bud.

4. It is difficult for British born representatives of home firms to get really behind the scenes (at any rate until they have been here several years) and know what is going on; in some respects they might just as well be in a foreign country.

In regard to the first point, the suggestion was made some time ago in these notes that an effort might be made by a few of the large firms at home to, each year, take in one or two engineering students of the most promising sort for a course of training in their works; there is little doubt that the Universities here would welcome any proposals of the kind.

All such students get nearly six months' vacation per year, and the great majority of them spend practically the whole of this period in each year of their college career in engineering workshops either in Canada or in the States—why not in Great Britain?

As has been argued before, those who went to the mother country for some of their training would be more likely, when they rose to positions of responsibility in this country, to give British firms at least a fairer chance than is the case under present conditions.

Such a scheme is quite feasible; cannot something be done on the lines suggested?

With reference to the second item, the London representatives of the Underwriters' Laboratories of Chicago will be able to assist the British manufacturer to some extent, and it is believed that some amount of useful work has already been accomplished; but more might be done.

As to item No. 3, good strong articles in the Canadian technical journals might be utilised with advantage, taking up such matters point by point and refuting them.

A Canadian section of the B.E.A.M.A. could, if properly organised, take up all such matters as the foregoing, including item No. 4, and, doubtless, from time to time, many others. New men coming out could be put up to a good many things which otherwise it would take them a long time (at the expense of their principals at home) to find out.

It is to be hoped that this matter may at least be discussed both in England and here as to its feasibility, and as to the advantages which might accrue from the existence of a Canadian branch of this Association.

BRADFORD ELECTRICAL EXHIBITION.

WE have received a copy of the preliminary prospectus of the Corporation of Bradford Electrical Exhibition, 1914, which is to be held at the Manningham Lane Skating Rink, Bradford, from October 6th to 24th inclusive. We understand that it has been the desire of the Electricity Committee of the Bradford Corporation for some years past that an exhibition of electrical apparatus should be held in the city in order that the inhabitants might have an opportunity of becoming acquainted with the great strides which have been made in the utilisation of electricity for all purposes, more especially in connection with the driving of textile machinery, the heating of premises, and for cooking. For various reasons it has been found impossible to hold such an exhibition until the present year, one of the chief being that a suitable hall to accommodate the exhibits could not be obtained, and another that the electrical manufacturers were not disposed to participate in exhibitions run on the lines which have hitherto been the practice.

A conveniently situated and fairly spacious building has now been found in Manningham Lane Skating Rink, and an annexe will be erected at the back of this building if applications for space are sufficiently numerous to warrant this being done. The British Electrical and Allied Manufacturers' Association (as representing the electrical manufacturing industry) have also come to an agreement with the Incorporated Municipal Electrical Association (as representing the Municipalities) as to the lines upon which exhibitions should be run, and the Bradford Exhibition will be the first to be held in accordance with the terms of that agreement.

The Exhibition is being promoted and run under the joint auspices of the B.E.A.M.A. and the Bradford Corporation, each party having appointed a number of their members to form a Special Committee of Management. The persons elected by the Bradford Electricity Committee are :—The Chairman (Ald. Geo. H. Robinson, J.P.), the Deputy-Chairman (Councillor J. Haley), Councillor

A. Ayrton, and Councillor H. Seed, together with the City electrical engineer (Mr. Thomas Roles), while the British Electrical and Allied Manufacturers' Association have appointed Mr. H. C. Palmer (General Electric Co., Ltd.), Mr. B. Longbottom (Electromotors, Ltd.), Mr. C. Rodgers (Siemens Bros. Dynamo Works, Ltd.) and Mr. A. J. Ireland (British Thomson-Houston Co., Ltd.) along with the Secretary (Mr. D. N. Dunlop). Mr. James M. Freer, of the firm of Freer & Howard, Ltd, who have been appointed organisers and managers of the Exhibition, is also a member of the Committee.

The Special Executive Sub-Committee authorised to undertake the detail work of management consists of the following three persons:—Mr. Thomas Roles (city electrical engineer, Bradford), Mr. D. N. Dunlop (secretary of the B.E.A.M.A.), and Mr. James M. Freer (Freer & Howard, Ltd., Exhibition organisers and managers).

The Electricity Committee of the Bradford Corporation are taking the greatest interest in the project, and it is hoped that the Exhibition will be of a standard which will attract not only the inhabitants of the city, but the public of the West Riding generally. It is the desire of the promoters that the hearty support of the committees or directors controlling all electricity supply undertakings in the West Riding should be obtained with a view to ensuring the success of the Exhibition. It is hoped that exhibits of textile and printing machinery, machine tools, laundry machinery, &c., will be displayed under working conditions driven by electric motors, and every facility will be given exhibitors for making such displays.

All persons and firms interested in the Exhibition should apply for particulars to Messrs. Freer & Howard, Ltd., of Ludgate Chambers, 30-32, Ludgate Hill, London, E.C.; and Mr. Thomas Roles, city electrical engineer, Bradford, will be pleased to give any information which may be required with regard to the venture.

We recommend all manufacturers to apply for a copy of the prospectus. It gives the following "Classification of Exhibits":—

1. Appliances and Apparatus for the Generation, Transmission, Transformation and Conversion of Electrical Energy.
2. Switches and Regulating and Control Gear.
3. Direct and Alternating Current Motors.
4. Electric Fittings for House, Shop, Office, Factory and Street Lighting.
5. Electric Lamps of all descriptions.
6. Electric Stoves and Cooking Apparatus.
7. Electric Water Heaters, Circulators and Geysers.
8. Electrically-operated Domestic Appliances.
9. Fans and other Appliances for Ventilating, Refreshing or Cleansing the air.
10. Vacuum Cleaning Plants.
11. Electric Hoists and Lifts of all kinds.
12. Textile Machinery.
13. Printing, Laundry, Engineering, Wood-working, Colliery, Mining and Quarrying Machinery.
14. All other kinds of Apparatus for the Utilisation of Electricity.

The Exhibition will be open from 11 a.m. to 10 p.m. daily for 17 days, and the charge for admission will be 6d. Current required by exhibitors on their stands will be supplied by the Corporation at ½d. per unit. Exhibitors will have the privilege of issuing their own invitation tickets to clients or friends. There will be no stalls permitted dealing in cheap articles of ornament or amusement having no special reference to the objects of the Exhibition.

NEW ELECTRICAL DEVICES, FITTINGS AND PLANT.

The Metrohm.

We illustrate in fig. 1 a new pattern of insulation testing set which has been put on the market by MESSRS. EVERETT, EDGCUMBE & CO., LTD., of Collindale Works, Hendon, under the name of the "Metrohm."

The instrument consists, as will be gathered from the figure, of an ohmmeter and generator combined in one case. The generator in the standard pattern gives 500 volts, and the instrument is scaled up to 50 megohms. In spite of the very modest dimensions of the case, the scale is nearly 5 in. in length and of extreme openness, and the indications are entirely independent of the generator pressure. Two important features of the Metrohm are its small size and light weight. It measures 7 × 8 × 9 in., and weighs but little over 16 lb., complete with generator. The latter is of special construction, giving a very large output with minimum weight. The armature runs in robust ball-bearings, and is provided with a "free-wheel" attachment to prevent damage through rough handling.

Amongst minor improvements may be mentioned the boldness of the pointer and scale, the "snappiness" of the reading, whereby considerable time is saved, and the fact that when the case is locked, not only is the glass protected from damage, but it is quite impossible for any unauthorised person so much as to turn the generator handle. As a result, the instrument can safely be left about without any fear of its being tampered with. For ease of carrying, a shoulder strap can be provided, or, if desired, a leather carrying case. Besides the standard range of 50 megohms and 500 volts, a number of others, such as 1,000 megohms at

FIG. 1.—THE "METROHM."

1,000 volts, can be supplied, and instruments adapted for workshop or switchboard use are constructed for the measurement of resistances of almost any value.

Motor Drive in Laundry.

We illustrate below a large calendering machine at Messrs. Connell's Laundry, London, which is driven by a Vickers 5-H.P. 480-volt 600/840-R.P.M. motor, and controlled by Vickers switchgear. The latter consists of a semi-enclosed double automatic starter and shunt regulator combined, to vary the speed of the motor from 600 to 840 R.P.M.

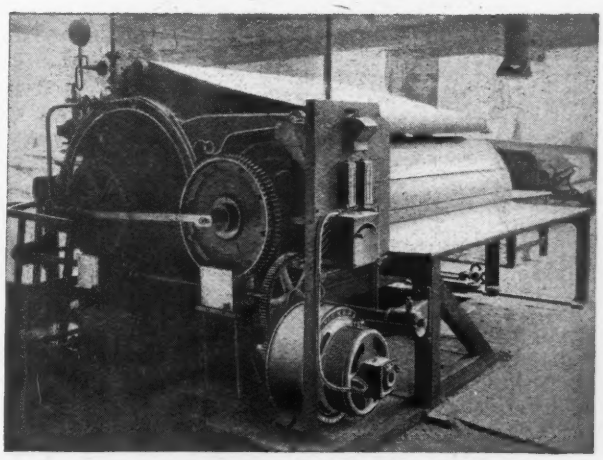


FIG. 2.—MOTOR-DRIVEN CALENDER WITH SAFETY GATE.

It is of particular interest to note in connection with this installation that a special gate is fitted across the rollers which prevents the hands of the girl operators from being drawn into and crushed by the rollers. Immediately on the slightest pressure, the gate trips a main switch which short-circuits the no-volt coil of the motor starter, and, at the same time, causes a brake to act on the motor shaft. This appliance works admirably, and we understand that what might have proved serious accidents have been prevented by the use of the safety gate. The safety device was designed and constructed entirely by MESSRS. TYLER AND FREEMAN, of 20, New Bridge Street, E.C., who were also the contractors for the electric driving installation in question.

Flexible Containers for Accumulators.

We have received from the NEW YORK—HAMBURG INDIA-RUBBER CO., LTD., of 89, Milton Street, E.C., samples of their containers and separators for storage cells, which are made in all qualities. The special features of the containers are their remarkable toughness and pliability; we have gone so far as to stand on the side of one of them at the open end—the weakest position; the box was, naturally, somewhat flattened, but was easily restored to its original shape, and is none the worse for this brutal treatment. The advantage claimed is that these boxes are immune from breakage by vibration or rough handling, while they are resistant to acids. The separators are of "hard rubber," and appear to be of very good quality.

Pyrometric Apparatus.

MR. R. W. PAUL, of New Southgate, London, N., has recently issued section M of his big catalogue, dealing with apparatus for temperature measurements of all kinds. Thermoelectric, resistance, and radiation pyrometers are described, each in various

FIG. 3.—UNIPIVOT TEMPERATURE INDICATOR, PATTERN P.

forms and for divers purposes. The Unipivot galvanometer usually forms part of the outfit, and is illustrated in the smaller wall pattern in fig. 3, with a scale reading in degrees, for use with a thermoelectric couple. The couples are made of differing metals and alloys depending upon the range of temperature to be dealt with; Eureka rod couples have an exposed junction of very

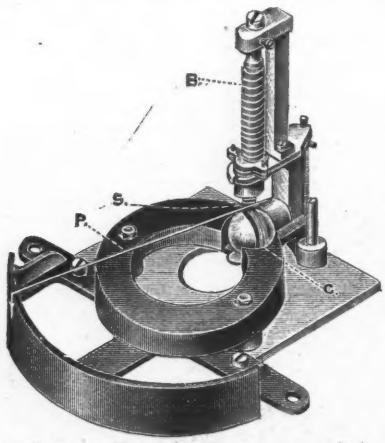


FIG. 4.—WORKING PARTS OF COMPENSATED INDICATOR.

robust construction, consisting of a pure iron tube welded to an internal rod of Eureka metal, and can withstand temperatures up to 1,200° F. To avoid the necessity of correcting the readings for the temperature of the cold end of the couple, the indicator can be fitted with Darling's compensator, as shown in fig. 4, which con-

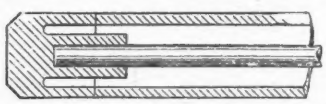


FIG. 5.—SECTION OF NICFER ROD COUPLE.

sists of a spiral B of two strips of metal welded together, and automatically adjusts the pointer P of the indicator by rotating the control spring S of the coil C. This correction becomes important in the measurement of low temperatures.

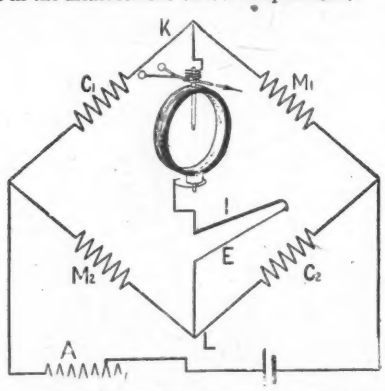


FIG. 6.—CONNECTIONS OF ELECTRICAL COMPENSATOR.

For temperatures up to 1,800° F. Nicfer couples are used; the hot junction in this case consists of a Eureka rod welded into a cap of Nicfer alloy. The cap is welded to a Nicfer tube, and as will be seen in fig. 5, efficiently protects the junction.

Iridio-platinum and rhodio-platinum couples carry the temperature range up to 2,400° F. and 2,900° F. respectively; with these, in order to allow of the use of a shorter and less expensive couple, an electrical automatic compensation system is employed, as shown in fig. 6. The arms of the Wheatstone bridge C_1 C_2 are of copper, M_1 M_2 of manganin; the current through the latter from the battery is limited by the resistance A to 0·1 ampere.

The galvanometer circuit includes the couple I E, and is joined across the points K L. All the resistances are compactly fitted in the thermo-couple connector. When the connector is at the standard cold-junction temperature (20° C.), no battery current flows through the galvanometer, but when the temperature of the cold junction departs from this value, a small out-of-balance current flows through the galvanometer and exactly compensates for the error.

In resistance thermometry the Harris indicator renders measurement as convenient and easy as in the thermoelectric system; various patterns are made, to which we have not space to refer in detail, nor can we deal with the alarms, recorders, accessories, &c., described in this interesting list.

Commutator Grinders.

The accompanying illustration shows a "long-snout" commutator grinder made by the Witton-Kramer Electric Tool and Hoist Co., Ltd., Witton, Birmingham, for whom the GENERAL ELECTRIC CO., LTD., of 67, Queen Victoria Street, London, E.C., are the sole selling agents; the grinder is in position for grinding the commutator of a 750-KW. "Witton" rotary converter. The method of fixing the grinder is very simple; the bolts of the bearing cap are slackened and a pair of bent angle irons inserted between the bearing cap and the pedestal, the bolts being then screwed down again tightly to hold the angle irons, which are cut away to

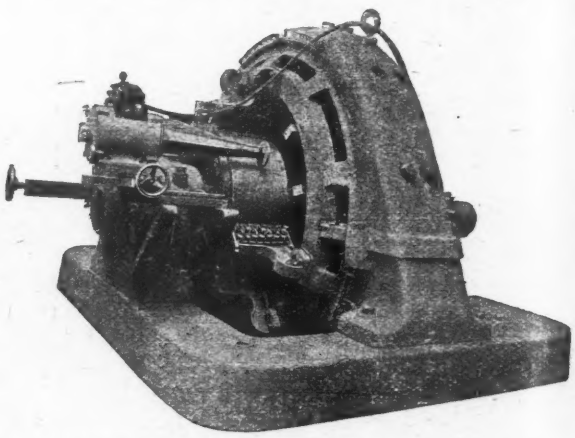


FIG. 7.—"WITTON KRAMER" LONG-SNOUT GRINDER IN USE.

receive the bolts. The slides for the grinder are bolted on the rigid horizontal platform formed by the two angle irons. On 50-cycle rotary converters the distance between adjacent brush sets is small, so that it is necessary to remove one set of brushes; in the illustration a second set has been removed to give a clear view of the grinding wheel. With a machine of this description it is not unusual, when occasion demands it, to undertake the grinding with the generator on load.

The Hemming Conduit Grip.

A new patent grip for ensuring the electrical continuity of steel conduit has been introduced by MESSRS. HEMMING CONDUIT GRIP, LTD., of 174, Corporation Street, Birmingham, and is illustrated in fig. 8. The essence of the device consists in the steel screw set in a boss on each way; as shown in the figure, a portion of the screw is cut away when boring the socket; after the tube has been inserted, a half-turn of the screw brings the uncut part of the thread into play, the sharp edges cutting into the tube and

FIG. 8.—HEMMING CONDUIT GRIP AND FITTING.

the threads firmly gripping the latter. At the same time the head of the screw comes home on the fitting, making a tight joint. The screw can be turned with either a spanner or a screw-driver, and a mark on the head shows where the thread is cut away, rendering it an easy matter to release the tube if desired at any future time. Tests show that the electrical conductivity of the joint is as good as that of the tube. The fittings are machined, with the screws in position, in the makers' works, and there are no loose parts.

FOREIGN AND COLONIAL TARIFFS ON ELECTRICAL GOODS.

AUSTRALIA.—A recent issue of the Board of Trade Journal states that advices to the Commercial Intelligence Branch of the Board of Trade from Australia emphasise how important it is that British firms exporting goods to the Commonwealth should comply strictly with every detail of the Australian Customs Regulations. Of primary importance to United Kingdom manufacturers are (1) the Regulations as to the Certificates of Origin which accompany goods, in order that they may be entitled to entry under the Preferential Tariff, and (2) The Commerce (Trade Descriptions) Act, 1905, and the Regulations issued thereunder.

(1) With regard to the certification of goods, H.M. Trade Commissioner for Australia (Mr. G. T. Milne) states that in view of complaints he has received, it is desirable that the attention of manufacturers and others making shipments to the Commonwealth should be called to the fact that the slightest informality in the matter of observance of the Regulations may involve delay in the delivery of goods.

For convenience of reference a copy of the form of certificate as at present prescribed is appended. The certificate is to be written, printed, or stamped on the invoice, or, attached thereto, and shall, in the latter case, show such particulars of the goods as will satisfy the Officer of Customs that the certificate and invoice refer to the same goods.

FORM OF CERTIFICATE TO BE PRODUCED WITH ENTRY AND INVOICES OF ANY IMPORTED GOODS CLAIMED TO BE ENTERED UNDER THE PREFERENTIAL TARIFF AS BEING THE PRODUCE OR MANUFACTURE OF THE UNITED KINGDOM.

I (*full name of person signing the certificate*), the ("*manufacturer*" or "*supplier*" *as the case may be*) of the articles included in this invoice, amounting to £ , and dated of goods supplied to (*name of purchaser*) do hereby declare that I have the means of knowing and I hereby certify as follows:—

1. That the said invoice is in all respects true and correct;
2. That every article mentioned in the said invoice has been either wholly or partially produced or manufactured in the United Kingdom;
3. As regards those articles only partially produced or manufactured in the United Kingdom—
   (*a*) That the final process or processes of manufacture have been performed in the United Kingdom.
   (*b*) That the expenditure in material of British production and (or) British labour (*calculated subject to the qualification hereunder*) in each and every article is not less than one-fourth of the factory or works cost of such article in its finished state;
4. That in the calculation of such proportion of British production or British labour none of the following items has been included or considered:—Manufacturer's profit or the profit or remuneration of any trader, agent, broker, or other person dealing in the article in its manufactured finished condition; cost of outside packages or any cost of packing the goods thereinto; any cost of conveying, insuring, or shipping the goods subsequent to their manufacture;
*5. With regard to any bottles, flasks or jars being containers of goods mentioned in the invoice, that such bottles, flasks or jars are of British manufacture, and if purchased from bottle exchanges have distinctive marks or features which enable me to certify to their British origin.

WITNESS..... SIGNATURE.....

Dated at this day of 19 .

*If Clause 5 cannot be certified to, the certifier should strike it out.

Certificate of Authorised Agent.—When the certificate is signed by some person *on behalf of* a manufacturer or supplier such person must state that he is duly authorised to do so. In such case the certificate shall be in the following form:—

I (*full name of person signing the certificate*) hereby certify that I am (*insert words "partner," "manager," "chief clerk," or "principal official," giving rank, as the case may be*) of (*name and address of manufacturer or supplier*) the ("*manufacturer*" or "*supplier*" *as the case may be*) of the articles included in this invoice amounting to £ , and dated , of goods supplied to , and do hereby declare that I am duly authorised to make and sign this certificate on behalf of the said (*name of manufacturer or supplier*), that I have the means of knowing and do hereby certify as follows:—(*then as in the Form above.*)

The following additional regulations should be noted:—

(1) Amendment of Preferential Certificate allowed in certain cases.—In the case of goods wholly produced or manufactured in the United Kingdom, there is no objection to manufacturers eliminating clauses 3 (*a*) and (*b*) and 4 from the declaration, and altering clause 2 to read:—

"That every article mentioned in the said invoice has been wholly produced or manufactured in the United Kingdom."

In cases where goods are put up in bottles, flasks, or jars, clause 5 of the present declaration must be included, and would then become clause 3.

In the case of manufacturers who do not deal in goods put up in bottles, flasks, or jars, there is no objection to their eliminating clause 5 and the footnote from the declaration printed on the invoices.

(2) Preferential Treatment of Goods Manufactured wholly in the United Kingdom.—Goods in which the *whole* of the manufacturing processes are performed in the United Kingdom are entitled to preference, notwithstanding that the proportion of the value produced by British labour is less than that prescribed for goods partially manufactured in the United Kingdom.

(3) Direct Shipment of Goods from the United Kingdom for Entry at Preferential Rates.—It is to be observed that in order to entitle goods to entry at preferential rates they must be shipped *direct* from the United Kingdom to Australia. Goods are however treated as shipped direct, even though they are transhipped at a port outside the United Kingdom, provided that they are not landed at such port for any other purpose than for transfer to another vessel.

Particular attention is directed to the necessity of having the signature to the certificate witnessed. The witness need not necessarily be a magistrate, notary, or other public official, but may be any person competent to sign as a witness to signatures on ordinary business documents.

In instances where manufacturers' invoices accompany suppliers' invoices, and it is clear from the marks and numbers or other evidence on the documents that the manufacturer was aware the goods were destined for Australia, the Preference certificate must be made on the manufacturers' invoice, if entry is claimed under the United Kingdom Preferential Tariff.

(2) With regard to the Commerce Act special regulations are in force regarding certain goods which are not of interest to readers of the ELECTRICAL REVIEW, but it is well to point out that in all cases where goods of any kind are marked in any way which may lead it to be supposed that they are the product of a country other than the actual country of origin, the goods are liable to be held in bond until they are properly marked, and in cases of wilful intent to be forfeited. Care is therefore necessary to see that goods are properly marked in accordance with the requirements of the Act, a copy of which may be seen at the Board of Trade, 73, Basinghall Street, London, E.C.

NEW PATENTS APPLIED FOR, 1914.

(NOT YET PUBLISHED).

Compiled expressly for this journal by MESSRS. W. P. THOMPSON & CO., Electrical Patent Agents, 285, High Holborn, London, W.C., and at Liverpool and Bradford, to whom all inquiries should be addressed.

13,374. "High-frequency current rectifier for rectifying high-frequency wave impulses in a wireless receiving circuit." C. S. LENZ. June 2nd.

13,383. "Telephone receivers." C. A. WEST. June 2nd.

13,410. "Telephone systems." M. S. CONNER and R. E. ROBINSON. June 2nd.

13,471. "Telegraph key." STERLING TELEPHONE AND ELECTRIC CO., LTD., and A. S. L. KOPP. June 2nd

13,472. "Crystal and like detectors." STERLING TELEPHONE AND ELECTRIC CO., LTD., and T. D. WARD-MILLER. June 2nd.

13,474. "Rotary spark gap." STERLING TELEPHONE AND ELECTRIC CO., LTD., and T. D. WARD-MILLER. June 2nd.

13,497. "Arrangements for regulating timepieces and the like by wireless signals." E. BELIN. June 3rd. (Complete).

13,520. "Radiating system for signalling by electric waves from aeroplanes." SIGNAL GES.M.B.H. June 3rd. (Addition to 736/13, and 23,728/13). (Complete).

13,523. "Telephone exchange systems." WESTERN ELECTRIC CO., LTD. June 3rd. (F. T. Woodward, Belgium). (Complete).

13,524. "Automatic switching mechanisms." WESTERN ELECTRIC CO., LTD. June 3rd. (F. T. Woodward, Belgium). (Complete).

13,529. "Electro-magnetic devices for imparting reciprocatory motion to objects." E. BACHELET. June 3rd.

13,538. "Electric welding and fusion deposition of metals." A. P. STROHMENGER. June 3rd.

13,541. "Manufacture of incandescent electric lamps." C. GLADITZ. June 3rd.

13,549. "Manufacture of metal wire." BRITISH THOMSON-HOUSTON CO., LTD. June 3rd. (General Electric Co., United States).

13,553. "Vehicle-lighting plants working with dynamo and storage battery." GES. FUR ELEKTRISCHE ZUGBELEUCHTUNG M.B.H. June 3rd. (Convention date, July 11th, 1913, Germany). (Complete).

13,554. "Vehicle-lighting plant working with dynamo and storage battery." June 3rd. GES. FUR ELEKTRISCHE ZUGBELEUCHTUNG M.B.H. (Addition to 13,553/14. Convention date, April 28th, 1914, Germany). (Complete).

13,566. "Hermetically-sealed electrical apparatus." BRITISH L.M. ERICSSON MANUFACTURING CO., LTD, and J. W. ULLETT. June 4th.

13,567. "Intercommunication telephone systems." BRITISH L.M. ERICSSON MANUFACTURING CO., and A. BROOKES. June 4th. (Addition to 22,253/12). (Complete).

13,575. "Telephony and telegraphy." A. T. M. JOHNSON, F. H. VARLEY, and A. C. N. TRY. June 4th.

13,579. "Thermical warmer for electrically heating induction pipes and carburettors of motor spirit-driven engines." J. P. GOODY. June 4th.

13,589. "Electrode carriers for electrolytic apparatus." SOC. ANON. L'OXHYDRIQUE FRANCAISE. June 4th. (Addition to 18,818/13. Convention date, June 25th, 1913, France). (Complete).

13,591. "Dynamo and system of electric lighting of trains and the like." H. LEITNER. June 4th.

13,605. "Spark-plugs." S. C. STOCKDALE. June 4th. (Complete).

13,624. "Electric lamps for motor-cars and other road vehicles." J. C. WOOD. June 4th.

13,626. "Protection of electrical distributing or current-carrying systems." F. COATES, H. W. CLOTHIER, and A. REYROLLE & CO., LTD. June 4th.

13,669. "Electric starters and lighting and battery charging systems applicable to motor-vehicles and the like." W. H. GLASER, and H. R. LLOYD. June 5th.

13,674. "Telephone transmitting-apparatus." W. K. L. DICKSON. June 5th.

13,699. "Apparatus for electroplating wire and the like." V. F. FEENY. June 5th. (Fabrik Elektrischer Zünder G.m.b.H., Germany). (Complete).

13,706. "Centrifugal governors for the internal-combustion engines of vehicles having electric power-transmission mechanism." GEB. SULZER. June 5th. (Convention date, September 16th, 1913, Germany). (Complete).

13,707. "Devices for putting up and taking down electric lamps." A. H. BURBRIDGE and R. E. ALDERMAN. June 5th. (Complete).

13,709. "Starting-apparatus for alternating-current motors of the slip-ring induction type." W. E. M AYRES. June 5th.

13,713. "Mica-separating machines." A. G. ELLIOTT. June 5th.

13,715. "Electro-magnetic locking devices." L. CADENEL. June 5th. (Convention date, June 10th, 1913, France). (Complete).

13,752. "Automatically-illuminated advertising-apparatus." DEUTSCHE EFFEKTLICHT-TELEPHON GES.M.B.H. and G. WILPERT. June 6th.

13,759. "Electric lamps." BRITISH THOMSON-HOUSTON CO., LTD. June 6th. (General Electric Co., United States).

13,771. "Apparatus for electro-plating iron and steel plates with other metals." S. O. COWPER-COLES. June 6th.

13,784. "Electric insulators." P. RAFFI. June 6th. (Convention date, September 22nd, 1913, Italy). (Complete).

EXPIRING PATENTS, TAKEN OUT IN 1900.

(*Concluded from page* 1016.)

17,262. "Electricity Measuring." Wright, A., and Reason Manufacturing Co. September 28th. Mercury voltameters are provided with platinum cathodes placed lower than the anodes, and the anodes may be partly platinum. The invention may be applied to the meters described in Specifications Nos. 2,222, 5,046, 5,593, and 9,746, A.D. 1900. In one arrangement the anode is mercury in an annular trough. In another form, the anode consists of mercury in a pocket provided with a feeding-bulb and of a roll of platinum foil, carried by a connecting wire, and partly above the mercury. The vessel is nearly filled with an electrolyte such as mercurous-nitrate solution, and sealed.

17,642. "Electricity Measuring." Duddell, W. du B. October 4th. Drawings to Specification. A continuous or alternating current is passed through a stationary non-inductive resistance, situated near the movable thermo-couple of a radio-micrometer, the deflection of which is a measure of the heat developed in the resistance, and of the current.

18,284. "Electric Transformers." Berry, A. F., and British Electric Transformer Manufacturing Co. October 13th. Relates to improvements upon the transformers described in Specifications Nos. 2,801 and 9,457, A.D. 1897. The core or magnetic circuit is formed of groups of iron sheets. Each group, when the sheets are assembled, is approximately sector-shaped, the plates in the centre being widest, and the others being shorter to give a stepped edge.

18,617. "Electric Switches." British Thomson-Houston Co. (Hewlett, E. M.). October 18th. Relates to switches for high-potential currents operated by a motor which is controlled from a safe distance. An arrangement is described for breaking a three-phase current.

18,865. "Wireless Telegraphy." Fleming, J. A., and Marconi's Wireless Telegraph Co. October 22nd. Relates to apparatus for the production of electric oscillations as employed in wireless telegraphy. An arrangement at the transmitting station is described in which an alternating generator has its circuit connected to the primary of a transformer through a double mercury cup switch, of which the bridge is mounted on a lever forming the rocking armature of two electromagnets. The magnets are in circuit with the front and back contacts of a key of which the circuit includes brushes rubbing on a metal ring on the generator shaft.

18,921. "Electric Furnaces." Benedicks, G. October 23rd. An induction furnace, for smelting or heating ores, metals, and the like, has an annular chamber formed by refractory walls surrounding a cylindrical space, in which is situated a coil carrying alternating current to induce heating-current in the substances in the chamber, or in a conductor in contact with these substances. The coil surrounds a part of an iron core.

19,451. "Electric Condensers." Mansbridge, G. F. October 30th. Condensers are made with paper, coated on one or both sides with metal in a finely-divided condition.

19,659. "Electrodeposition." Szirmay, L., and Kollerich, L., von. November 2nd. To coat iron and steel goods by electrodeposition with zinc, an electrolyte is employed consisting of a mixture of zinc sulphate, "magnalium" sulphate, and dextrose. The anode is of pure rolled zinc, the temperature of the bath 18 deg. C., the current density 100 amperes per square metre of cathode surface, and the tension 4 to 4½ volts. The bath is kept agitated during deposition. Polarization is prevented by this process.

19,674. "Railways, &c., Electric." Lake, H. H. (Brown, W. M.). November 2nd. Relates to electric railways and tramways on a surface contact system with switches operated by magnets on the vehicle, and cannot be well described without reference to drawings.

19,988. "Railways and Tramways." Sykes, W. R., Johnson, A. H., and Cooke, C. J. November 7th. Fishplates are made in two parts, each held to the rails by ordinary fish-bolts, and held together by bolts through lugs. Insulating-material is placed between the ends of the rails and plates, and insulating collars and washers protect the bolts. Various forms are described.

20,507. "Gas and Like Engines." Hall, R. F. November 14th. The insulator in a sparking plug comprises a number of mica discs placed on the conductor and pressed together by a nut. The mica is covered with a suitable varnish, such as shellac varnish, and subjected to high temperature for a considerable time; it is then turned to a taper in the lathe to fit the plug which may carry the other sparking point. Modifications are described.

20,576. "Wireless Telegraphy." Fleming, J. A., and Marconi's Wireless Telegraph Co. November 14th. Relates to the transmitting-apparatus in wireless telegraph systems when the generator consists of an alternator working through a high-tension transformer. The secondary circuit of the transformer includes a condenser and the primary of an oscillation transformer, but is bridged by a spark gap. The sparks normally form a short circuit, and the interruptions are obtained by blowing out the spark by means of a jet of compressed air. The various circuits are tuned to give electric resonance.

21,216. "Carbon." Justice, P. M. (International Acheson Graphite Co.). November 23rd. Relates to a method of graphitizing electrodes and other carbonaceous articles, and consists in subjecting them in an electric furnace to a sufficiently high temperature and for a sufficient time to convert a greater or less proportion of their amorphous carbon into graphite, the electrodes or articles being embedded in a relatively low-conducting material and arranged in piles so that the flow of electric current is transversely to their length or greatest dimension. The holes are also separated by layers of low-conducting material.

21,629. "Converting Electric Currents." Duddell, W. du B. November 29th. Relates to means for converting direct into alternating currents, such alternating current being so sympathetic in character as to be utilized for reinforcing existing currents, such as in telephone circuits, &c. When a direct current is sent through a circuit containing a conductor such as an arc lamp, and the resistance is varied, an alternating or varying current may be obtained in a shunt circuit. Alternating currents of different character may be produced and used in wireless telegraphy or for producing a musical arc, for lighting purposes, etc.

21,879. "Lighting Theatre Stages." Digby, T. J. December 3rd. Gradual variations in the colour or intensity of the light projected by a single electric arc or similar apparatus upon theatre stages are effected by the use of frosted screens mounted in frames and applied like photographic shutters, in combination with the ordinary transparent screens of different colours. A method of making such screens is described.

22,126. "Wireless Telegraphy." Fleming, J. A., and Marconi's Wireless Telegraph Co. December 5th. Relates to a system of transmission in wireless telegraphy, such as described in Specification No. 20,576 A.D. 1900. A second primary of a regulating-transformer is arranged in the alternator circuit. The regulating-transformer transforms down, and its secondary circuit is provided with a key and two resistances of different values, each having a signalling-key.

22,372. "Treating Wool, Etc." White & Co., J. G., and White, J. G. December 8th. Relates to a method and apparatus for discharging or neutralizing electricity developed or collected in wool or other fibres during the process of manufacture. In one arrangement, one terminal of the secondary circuit of an induction coil is connected with a comb or series of metal points arranged in proximity to the wool. Static electricity may be discharged on to the fibrous material, or the material may be passed subsequent to the spinning operation in front of a Crookes tube.

23,389. "Dynamo-Electric Machines." British Thomson-Houston Co. (Lunt, A D.). December 21st. Relates to the regulation of dynamo-electric machines, and more particularly to the regulation of rotary converters receiving direct current and delivering alternating current, which machines are liable to wide variations of speed owing to variations in the armature reaction. The field strength of the converter is automatically regulated by means which are responsive directly to variations in the amount of lagging or leading current in the alternating-current circuit of the machine.

23,774. "Producing Numerals, Letters, &c. by Electric Lamps." Johnson, W., and Makin, J. December 29th. Letters, numerals, and words, &c., are formed by electric lamps, which are mounted on a board within square or diamond-shaped cells formed by interlocking-strips which serve as reflectors. Switch gear for lighting certain lamps to form numerals, &c., is described.

PUBLISHED SPECIFICATIONS.

Copies of any of the Specifications in the following list may be obtained of MESSRS. W. P. THOMPSON & CO., 285, High Holborn, W.C., and at Liverpool and Bradford; price, post free, 9d. (in stamps).

1912.

16,647. RAILWAY SAFE-RUNNING DEVICES. A. R. Angus. February 17th. (February 17th, 1913).

1913.

8,866. MEANS FOR CONTROLLING THE SUPPLY OF FUEL TO, AND THE IGNITION IN, INTERNAL COMBUSTION ENGINES ON MOTOR VEHICLES. M. J. W. Pike. April 15th.

8,956. INCANDESCENT BODY FOR ELECTRIC GLOW LAMPS AND PROCESS FOR THE MANUFACTURE OF SUCH BODIES. A. Just. April 16th. (April 18th, 1912).

10,105. APPARATUS FOR SINGEING THE HAIR BY ELECTRICITY. J. H. Watkins. April 30th. (October 29th, 1913).

11,503. MARINERS' COMPASSES. Kelvin and James White, Ltd., M. B. Field and D. Renfrew. May 17th. (Cognate Application, 14,293/13).

11,533. REGULATION OF LIFTS, ELEVATORS, AND THE LIKE. D. Tessieri. May 17th.

11,590. GRADED SERVICE AUTOMATIC OR SEMI-AUTOMATIC TELEPHONE SYSTEM. H. Baron. (Heimann). May 19th. (Addition to 11,261/12).

11,878. OPTICAL LANTERN WITH GAS EVACUATING DEVICE. F. G. Huber. May 21st.

11,886. COMMUTATORS FOR DYNAMO-ELECTRIC MACHINES. C. Zenk. May 21st. (May 21st, 1912).

11,888. AUTOMATIC OR SEMI-AUTOMATIC GRADED SERVICE TELEPHONE SYSTEM. H. Baron. (Heimann). May 21st.

11,998. TELEPHONE SYSTEMS. Automatic Telephone Manufacturing Co. (Automatic Electric Co.). May 22nd.

12,168. COIL PARTICULARLY FOR ELECTRICAL PURPOSES, AND METHOD OF AND APPARATUS FOR MANUFACTURING THE COIL. H. Wade (Leeson). May 24th.

12,527. MEANS FOR INDICATING OR RECORDING, OR INDICATING AND RECORDING WHEN A STORAGE BATTERY HAS BEEN CHARGED OR DISCHARGED TO A DESIRED EXTENT. R. Rankin and Electrical Power Storage Co. May 29th.

13,588. SUNK ELECTRIC SWITCHES, WALL-SOCKETS, AND BRACKETS. J. B. Meiklejohn. June 12th.

13,989. CONSTRUCTION OF ELECTRICAL ELEMENTS FOR COOKING PURPOSES. R. F. Venner. June 17th.

14,112. ELECTRIC SWITCHES. P. S. Turner. June 18th.

14,631. MICROPHONES. International Electric Co. (Akt. Ges. Mix & Genest). June 24th.

15,550. PROTECTIVE DEVICES FOR ELECTRIC DISTRIBUTION SYSTEMS. British Thomson-Houston Co. (General Electric Co.). July 5th.

15,757. PROCESSES OF PRODUCING BORON SUBOXIDE. British Thomson-Houston Co. (General Electric Co.). July 8th.

16,054. REGULATING SYSTEMS OF ELECTRICAL DISTRIBUTION. British Thomson-Houston Co. (General Electric Co.). July 11th.

16,299. REFRACTORY FIBROUS MATERIAL AND THE PROCESS OF MAKING THE SAME British Thomson-Houston Co. (General Electric Co.). July 15th.

16,964. PROTECTIVE ATTACHMENT FOR TELEPHONE MOUTH-PIECES AND EAR-PIECES. S. T. Richardson. July 24th.

16,969. TELEGRAPHIC RECEIVING APPARATUS ADAPTED TO ACTUATE A PERFORATOR OR ANALOGOUS DEVICE. Eastern Telegraph Co., & J. S. Jenkins. July 24th.

19,085. BOXES FOR ELECTRICAL CONTACTS. J. Bonham. August 22nd.

19,755. REGISTERING DEVICE FOR MOUNTING STEREO, ELECTRO, AND LIKE PRINTING PLATES. E. W. J. Barnett. September 1st.

20,270. DEVICE APPLIED TO SUBMARINE SYRENS FOR PRODUCING SHORT SIGNALS IN RAPID SUCCESSION, ESPECIALLY MORSE SIGNALS. Signal Ges. September 8th. (October 11th, 1912).

22,319. ARC LIGHT CARBONS. H. Ayrton. October 3rd. (Cognate Application, 7,792/14).

23,570. SYNCHRONISED ELECTRICALLY-CONTROLLED CLOCKS. C. E. O'Keenan. October 17th. (October 25th, 1912).

23,766. ADJUSTABLE ARM OR SUPPORT FOR CHAIRS, TABLES, BEDS, AND THE LIKE, APPLICABLE ALSO FOR SUPPORTING TELEPHONES, TYPEWRITERS, AND SIMILAR APPLIANCES, AND FOR OTHER PURPOSES. W. Erwin. October 21st.

25,834. ELECTRIC MOTOR-DRIVEN VEHICLES. K. Von Kando. November 11th.

25,851. SAFETY SIGNALLING AND CONTROLLING DEVICES FOR RAILWAYS. D. A. Cooper. November 11th. (Convention date not granted).

26,388. KEYBOARD MUSICAL INSTRUMENTS WITH ELECTRO-MAGNETICALLY VIBRATED STRINGS. R. Poetzelberger. November 17th. (November 18th, 1912).

26,802. ELECTROSTATIC SEPARATORS FOR TREATING INFLAMMABLE OR EXPLOSIVE MATERIALS. J. Kraus. November 21st. (October 27th, 1913).

26,906. AUTOMATIC REGULATING DEVICES FOR DYNAMOS OR OTHER ELECTRIC MACHINES. Robert Bosch (Firm of). November 22nd. (November 1st, 1913).

27,645. ATTACHMENTS FOR MOVING-PICTURE APPARATUS. A. Szeliga. December 1st.

28,532. LIGHTING-PLANT FOR STUDIOS AND THE LIKE. J. B. McDowell. December 10th.

29,284. ELECTRIC LAMP FOR ADVERTISEMENTS, SIGNALS, OR THE LIKE. S. Klein. December 19th. (December 20th, 1912).

29,821. ELECTRIC SWITCHES. S. C. Davidson. December 27th.